HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY

CHAPTER 71

L.E.P. 1- 4 Revised to Reflect this revision indicating new,revised, and/or deleted pages

T. OF C. 1- 2 Revised to reflect this revision

71-00-00 401- 402, 406, 413- 414, 446- 448, 452- 459, 463- 464, 470
Minor additions and amplification
ADDED CAUTION CONCERNING SKINNY CAST YOKE.
Layout improved

71-00-00 505, 508, 520-A509
Minor, non technical corrections
REVISED TYPO ERRORS.
Minor additions and amplification
REVISED REFERENCED PROCEDURE.
ADDED TO PERFORM A LEAK TEST OF DRAIN MANIFOLD AND DRAIN SHROUDS IN PARAGRAPH "WET MOTORING".
Layout improved

71-70-00 604- 610
Minor additions and amplification
ADDED INFORMATION TO REPLACE THE ENGINE WHEN THE OIL WETTING ON THE CRF STRUT 6 OR LP RECOUP TUBE IS DETECTED AND THE OIL CONSUMPTION IS OVER LIMITS.
Layout improved

CHAPTER 71

POWER PLANT

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively
Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary

CH/SE/SU	C	PAGE	DATE
RECORD			
OF TEMP.			
REVISION			
L.E.P.	R	1- 4	Jun01/10
T. of C.	R	1	Jun01/10
T. of C.	R	2	Jun01/10
T. of C.		3	Jun01/09
T. of C.		4	Jun01/09
T. of C.		5	Jun01/09
71-00-00		1	Jun01/04
71-00-00		2	Jun01/04
71-00-00		3	Jun01/04
71-00-00		4	Jun01/04
71-00-00		5	Jun01/04
71-00-00	R	401	Jun01/10
71-00-00	R	402	Jun01/10
71-00-00		403	Jun01/09
71-00-00		404	Jun01/04
71-00-00		405	Jun01/04
71-00-00	R	406	Jun01/10
71-00-00		407	Jun01/04
71-00-00		408	Jun01/04
71-00-00		409	Jun01/04
71-00-00		410	Jun01/09
71-00-00		411	Jun01/09
71-00-00		412	Jun01/09
71-00-00	R	413	Jun01/10
71-00-00	R	414	Jun01/10
71-00-00		415	Jun01/09
71-00-00		416	Jun01/09
71-00-00		417	Jun01/09
71-00-00		418	Jun01/09
71-00-00		419	Jun01/09
71-00-00		420	Jun01/09
71-00-00		421	Jun01/09
71-00-00		422	Jun01/09
71-00-00		423	Jun01/09
71-00-00		424	Jun01/09
71-00-00		425	Jun01/09
71-00-00		426	Jun01/09
71-00-00		427	Jun01/09
71-00-00		428	Jun01/09
71-00-00		429	Jun01/09
71-00-00		430	Jun01/09
71-00-00		431	Jun01/09
71-00-00		432	Jun01/09
71-00-00		433	Jun01/09
71-00-00		434	Jun01/09
71-00-00		435	Jun01/09
71-00-00		436	Jun01/09
71-00-00		437	Jun01/09
71-00-00		438	Jun01/09
71-00-00		439	Jun01/09
71-00-00		440	Jun01/09
71-00-00		441	Jun01/09
71-00-00		442	Jun01/09
71-00-00		443	Jun01/09
71-00-00		444	Jun01/09
71-00-00		445	Jun01/09
71-00-00	R	446	Jun01/10
71-00-00	R	447	Jun01/10
71-00-00	R	448	Jun01/10
71-00-00		449	Jun01/09
71-00-00		450	Jun01/09
71-00-00		451	Jun01/09
71-00-00	R	452	Jun01/10
71-00-00	R	453	Jun01/10
71-00-00	R	454	Jun01/10
71-00-00	R	455	Jun01/10
71-00-00	R	456	Jun01/10
71-00-00	R	457	Jun01/10
71-00-00	R	458	Jun01/10
71-00-00	R	459	Jun01/10
71-00-00		460	Jun01/09
71-00-00		461	Jun01/09
71-00-00		462	Jun01/09
71-00-00	R	463	Jun01/10
71-00-00	R	464	Jun01/10
71-00-00		465	Jun01/09
71-00-00		466	Jun01/09
71-00-00		467	Jun01/09
71-00-00		468	Jun01/09
71-00-00		469	Jun01/09
71-00-00	R	470	Jun01/10
71-00-00		471	Jun01/09
71-00-00		472	Jun01/09
71-00-00		501	Jun01/06
71-00-00		502	Jun01/04
71-00-00		503	Jun01/04
71-00-00		504	Jun01/04
71-00-00	R	505	Jun01/10
71-00-00		506	Jun01/04
71-00-00		507	Jun01/06
71-00-00	R	508	Jun01/10
71-00-00		509	Jun01/04
71-00-00		510	Jun01/04
71-00-00		511	Jun01/04
71-00-00		512	Jun01/04
71-00-00		513	Jun01/07
71-00-00		514	Jun01/04
71-00-00		515	Jun01/04
71-00-00		516	Dec01/06
71-00-00		517	Jun01/04
71-00-00		518	Jun01/04
71-00-00		519	Jun01/04
71-00-00	R	520	Jun01/10
71-00-00	R	521	Jun01/10
71-00-00	R	522	Jun01/10
71-00-00	R	523	Jun01/10
71-00-00	R	524	Jun01/10
71-00-00	R	525	Jun01/10
71-00-00	R	526	Jun01/10
71-00-00	R	527	Jun01/10
71-00-00	R	528	Jun01/10
71-00-00	R	529	Jun01/10
71-00-00	R	530	Jun01/10
71-00-00	R	531	Jun01/10
71-00-00	R	532	Jun01/10
71-00-00	R	533	Jun01/10
71-00-00	R	534	Jun01/10
71-00-00	R	535	Jun01/10
71-00-00	R	536	Jun01/10
71-00-00	R	537	Jun01/10
71-00-00	R	538	Jun01/10

Printed in France

CH/SE/SU	C	PAGE	DATE
71-00-00	R	539	Jun01/10
71-00-00	R	540	Jun01/10
71-00-00	R	541	Jun01/10
71-00-00	R	542	Jun01/10
71-00-00	R	543	Jun01/10
71-00-00	R	544	Jun01/10
71-00-00	R	545	Jun01/10
71-00-00	R	546	Jun01/10
71-00-00	R	547	Jun01/10
71-00-00	R	548	Jun01/10
71-00-00	R	549	Jun01/10
71-00-00	R	550	Jun01/10
71-00-00	R	551	Jun01/10
71-00-00	R	552	Jun01/10
71-00-00	R	553	Jun01/10
71-00-00	R	554	Jun01/10
71-00-00	R	555	Jun01/10
71-00-00	R	556	Jun01/10
71-00-00	R	557	Jun01/10
71-00-00	R	558	Jun01/10
71-00-00	R	559	Jun01/10
71-00-00	R	560	Jun01/10
71-00-00	R	561	Jun01/10
71-00-00	R	562	Jun01/10
71-00-00	R	563	Jun01/10
71-00-00	R	564	Jun01/10
71-00-00	R	565	Jun01/10
71-00-00	R	566	Jun01/10
71-00-00	R	567	Jun01/10
71-00-00	R	568	Jun01/10
71-00-00	R	569	Jun01/10
71-00-00	R	570	Jun01/10
71-00-00	R	571	Jun01/10
71-00-00	R	572	Jun01/10
71-00-00	R	573	Jun01/10
71-00-00	R	574	Jun01/10
71-00-00	R	575	Jun01/10
71-00-00	R	576	Jun01/10
71-00-00	R	577	Jun01/10
71-00-00	R	578	Jun01/10
71-00-00	R	579	Jun01/10
71-00-00	R	580	Jun01/10
71-00-00	R	581	Jun01/10
71-00-00	R	582	Jun01/10
71-00-00	R	583	Jun01/10
71-00-00	R	584	Jun01/10
71-00-00	R	585	Jun01/10
71-00-00	R	586	Jun01/10
71-00-00	R	587	Jun01/10
71-00-00	R	588	Jun01/10
71-00-00	R	589	Jun01/10
71-00-00	R	590	Jun01/10
71-00-00	R	591	Jun01/10
71-00-00	R	592	Jun01/10
71-00-00	R	593	Jun01/10
71-00-00	R	594	Jun01/10
71-00-00	R	595	Jun01/10
71-00-00	R	596	Jun01/10
71-00-00	R	597	Jun01/10
71-00-00	R	598	Jun01/10
71-00-00	R	599	Jun01/10
71-00-00	R	A500	Jun01/10
71-00-00	R	A501	Jun01/10
71-00-00	R	A502	Jun01/10
71-00-00	R	A503	Jun01/10
71-00-00	R	A504	Jun01/10
71-00-00	R	A505	Jun01/10
71-00-00	R	A506	Jun01/10
71-00-00	R	A507	Jun01/10
71-00-00	R	A508	Jun01/10
71-00-00	N	A509	Jun01/10
71-10-00		1	Jun01/04
71-10-00		2	Jun01/04
71-10-00		3	Jun01/04
71-11-00		1	Jun01/04
71-11-00		2	Jun01/04
71-11-00		3	Jun01/04
71-11-00		401	Jun01/04
71-11-00		402	Jun01/04
71-11-00		403	Jun01/04
71-11-00		404	Jun01/04
71-11-00		601	Jun01/06
71-11-00		602	Jun01/06
71-11-00		603	Jun01/06
71-11-00		604	Jun01/06
71-11-00		605	Jun01/06
71-11-00		606	Jun01/06
71-11-00		607	Jun01/06
71-11-00		608	Jun01/06
71-11-00		609	Jun01/06
71-11-00		610	Jun01/06
71-11-00		611	Jun01/04
71-13-00		1	Jun01/04
71-13-00		2	Jun01/04
71-13-00		3	Jun01/04
71-13-00		4	Jun01/04
71-13-00		5	Jun01/04
71-13-00		6	Jun01/04
71-13-00		7	Jun01/04
71-13-00		8	Jun01/04
71-13-00		9	Jun01/04
71-13-00		10	Jun01/04
71-13-00		11	Jun01/04
71-13-00		12	Dec01/90
71-13-00		13	Jun01/04
71-13-00		14	Jun01/04
71-13-00		15	Jun01/04
71-13-00		16	Jun01/04
71-13-00		17	Jun01/04
71-13-00		18	Jun01/04
71-13-00		19	Jun01/04
71-13-00		20	Jun01/04
71-13-00		21	Jun01/04
71-13-00		22	Jun01/04
71-13-00		23	Jun01/04
71-13-00		24	Jun01/04
71-13-00		301	Jun01/09
71-13-00		302	Jun01/09
71-13-00		303	Jun01/04
71-13-00		304	Jun01/04
71-13-00		305	Jun01/09
71-13-00		306	Jun01/04
71-13-00		307	Jun01/04
71-13-00		308	Jun01/09
71-13-00		309	Jun01/09
71-13-00		310	Jun01/09
71-13-00		311	Jun01/09
71-13-00		312	Jun01/09
71-13-00		313	Jun01/09
71-13-01		401	Jun01/04
71-13-01		402	Jun01/04
71-13-01		403	Jun01/04
71-13-01		404	Jun01/04
71-13-01		501	Jun01/04
71-13-01		502	Jun01/04
71-13-01		503	Jun01/04
71-13-01		601	Jun01/09
71-13-01		602	Jun01/09
71-13-01		603	Jun01/06
71-13-01		604	Jun01/09
71-13-01		605	Jun01/06
71-13-01		606	Jun01/09
71-13-02		401	Jun01/04
71-13-02		402	Jun01/04
71-13-02		403	Jun01/04
71-13-02		501	Jun01/04
71-13-02		502	Jun01/04
71-13-02		503	Jun01/04
71-13-02		601	Jun01/09
71-13-02		602	Jun01/09

CH/SE/SU	C	PAGE	DATE
71-13-02		603	Jun01/09
71-13-02		604	Jun01/09
71-13-02		605	Jun01/06
71-13-02		606	Jun01/04
71-13-02		607	Jun01/09
71-13-03		401	Jun01/08
71-13-03		402	Jun01/08
71-13-03		403	Jun01/08
71-13-03		404	Jun01/08
71-13-03		405	Jun01/08
71-13-03		406	Jun01/08
71-13-03		407	Jun01/08
71-13-03		408	Jun01/08
71-13-03		409	Jun01/08
71-13-03		410	Jun01/08
71-13-03		411	Jun01/08
71-13-03		412	Jun01/08
71-13-03		501	Jun01/04
71-13-03		502	Jun01/09
71-13-03		503	Jun01/08
71-13-03		504	Jun01/04
71-13-03		505	Jun01/04
71-13-03		506	Jun01/05
71-13-04		401	Jun01/04
71-13-04		402	Jun01/04
71-13-05		401	Jun01/04
71-13-05		402	Jun01/04
71-13-05		403	Jun01/04
71-13-05		404	Jun01/04
71-13-05		601	Jun01/09
71-13-05		602	Jun01/09
71-13-05		603	Jun01/09
71-13-05		604	Jun01/09
71-13-06		401	Jun01/04
71-13-06		402	Jun01/04
71-13-06		403	Jun01/04
71-13-06		404	Jun01/04
71-13-06		601	Jun01/09
71-13-06		602	Jun01/09
71-13-06		603	Jun01/09
71-13-07		401	Jun01/04
71-13-07		402	Jun01/04
71-13-07		403	Jun01/04
71-13-08		501	Jun01/05
71-13-08		502	Jun01/04
71-13-08		503	Jun01/04
71-13-08		504	Jun01/04
71-13-08		505	Jun01/04
71-13-08		506	Jun01/04
71-13-08		507	Jun01/04
71-13-08		508	Jun01/04
71-13-08		509	Jun01/04
71-13-08		510	Jun01/04
71-13-08		511	Jun01/04
71-13-08		512	Jun01/04
71-13-08		513	Jun01/05
71-13-08		514	Jun01/04
71-13-08		515	Jun01/04
71-13-08		516	Jun01/04
71-20-00		1	Jun01/04
71-20-00		2	Jun01/04
71-20-00		3	Jun01/04
71-20-00		4	Jun01/04
71-20-00		5	Jun01/04
71-21-00		401	Jun01/04
71-21-00		402	Jun01/06
71-21-00		403	Jun01/04
71-21-00		404	Jun01/04
71-21-00		405	Jun01/04
71-21-00		406	Jun01/04
71-21-00		407	Jun01/04
71-21-00		408	Jun01/06
71-21-00		409	Jun01/06
71-21-00		601	Jun01/07
71-21-00		602	Jun01/07
71-21-00		603	Jun01/04
71-22-00		401	Jun01/04
71-22-00		402	Jun01/04
71-22-00		601	Jun01/04
71-22-00		602	Jun01/04
71-22-00		603	Jun01/04
71-30-00		1	Jun01/04
71-30-00		2	Jun01/04
71-40-00		1	Jun01/04
71-40-00		401	Jun01/04
71-40-00		402	Jun01/04
71-40-00		403	Jun01/04
71-40-00		404	Jun01/04
71-40-00		405	Jun01/04
71-40-00		406	Jun01/04
71-40-00		407	Jun01/04
71-40-00		408	Jun01/04
71-40-00		409	Jun01/04
71-40-00		410	Jun01/04
71-40-00		411	Jun01/04
71-40-00		412	Jun01/04
71-40-00		413	Jun01/04
71-40-00		414	Jun01/04
71-40-00		415	Jun01/04
71-40-00		416	Jun01/04
71-40-00		417	Jun01/04
71-40-00		418	Jun01/04
71-40-00		419	Jun01/04
71-40-00		420	Jun01/04
71-40-00		421	Jun01/04
71-40-00		422	Jun01/04
71-40-00		423	Jun01/04
71-40-00		424	Jun01/04
71-50-00		1	Jun01/04
71-50-00		2	Jun01/04
71-50-00		3	Jun01/04
71-50-00		4	Jun01/04
71-50-00		801	Jun01/04
71-50-00		802	Jun01/04
71-50-00		803	Jun01/04
71-50-00		804	Jun01/07
71-50-00		805	Jun01/04
71-50-00		806	Jun01/04
71-50-00		807	Jun01/04
71-50-00		808	Jun01/04
71-50-00		809	Jun01/04
71-50-00		810	Jun01/04
71-50-00		811	Jun01/04
71-51-01		401	Jun01/04
71-51-01		402	Jun01/04
71-51-01		403	Jun01/04
71-51-01		404	Jun01/04
71-51-01		405	Jun01/04
71-51-01		406	Jun01/04
71-51-01		407	Jun01/04
71-51-01		408	Jun01/04
71-51-01		409	Jun01/04
71-51-01		410	Jun01/04
71-52-01		201	Jun01/04
71-52-01		202	Jun01/04
71-52-01		203	Jun01/04
71-52-01		204	Jun01/04
71-52-01		205	Jun01/04
71-52-01		206	Jun01/04
71-52-01		207	Jun01/04
71-52-01		401	Jun01/04
71-52-01		402	Jun01/04
71-52-01		403	Jun01/04
71-52-01		404	Jun01/09
71-52-01		405	Jun01/09

CH/SE/SU	C	PAGE	DATE
71-52-01		406	Jun01/09
71-52-01		407	Jun01/09
71-52-01		408	Jun01/09
71-52-01		409	Jun01/09
71-52-01		410	Jun01/09
71-52-01		411	Jun01/09
71-52-01		412	Jun01/09
71-52-01		413	Jun01/09
71-52-01		414	Jun01/09
71-52-01		415	Jun01/09
71-52-01		416	Jun01/09
71-52-01		417	Jun01/09
71-53-01		401	Jun01/04
71-53-01		402	Jun01/05
71-53-01		403	Jun01/04
71-53-01		404	Jun01/04
71-53-01		405	Jun01/05
71-53-01		406	Jun01/05
71-70-00		1	Jun01/04
71-70-00		2	Jun01/04
71-70-00		3	Jun01/04
71-70-00		4	Jun01/04
71-70-00		5	Jun01/04
71-70-00		6	Jun01/04
71-70-00		7	Jun01/04
71-70-00		201	Jun01/04
71-70-00		202	Jun01/04
71-70-00		203	Jun01/04
71-70-00		204	Jun01/04
71-70-00		205	Jun01/04
71-70-00		601	Jun01/04
71-70-00		602	Jun01/05
71-70-00		603	Jun01/05
71-70-00	R	604	Jun01/10
71-70-00	R	605	Jun01/10
71-70-00	R	606	Jun01/10
71-70-00	R	607	Jun01/10
71-70-00	R	608	Jun01/10
71-70-00	R	609	Jun01/10
71-70-00	R	610	Jun01/10
71-70-00		611	Jun01/04
71-70-00		612	Jun01/04
71-70-00		613	Jun01/04
71-70-21		201	Jun01/04
71-70-21		202	Jun01/04
71-70-21		203	Jun01/04
71-70-21		204	Jun01/04
71-70-21		205	Jun01/04
71-70-21		401	Jun01/09
71-70-21		402	Jun01/09
71-70-21		403	Jun01/04
71-70-21		404	Jun01/04
71-70-21		405	Jun01/04
71-70-21		406	Jun01/04
71-70-21		407	Jun01/04
71-70-21		408	Jun01/04
71-70-31		401	Jun01/04
71-70-31		402	Jun01/04

CHAPTER 71

POWER PLANT

TABLE OF CONTENTS

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
GENERAL	71-00-00			
Description and Operation			1	001-100,
General			1	001-100,
Cowling			1	001-100,
Mounts			1	001-100,
Fire Seals			1	001-100,
Attachment Fittings			1	001-100,
Electrical Harness			1	001-100,
Engine Drains			5	001-100,
Removal/Installation			401	001-100,
Disconnection of Engine Pylon/ Engine Junctions			410	001-100,
Removal of Engine by Means of Engine Bootstrap			433	001-100,
Removal of Engine by Means of Hydraulic Positioner			446	001-100,
Corrosion Prevention at FWD and AFT Attachments			450	001-100,
Preparation For Installation			451	001-100,
Installation of Engine by Means of Hydraulic Positioner			452	001-100,
Installation of Engine by Means of the Engine Bootstrap			456	001-100,
Connection of Engine to Pylon			459	001-100,
Test and Close-up			470	001-100,
Adjustment/Test			501	001-100,
Type of Testing After Engine Component Replacement			502	001-100,
Safety and Operating Precautions			506	001-100,
Operating Limits			516	001-100,
Procedure in Case of Engine Fire			526	001-100,
Internal Fire			526	001-100,
External Fire in Nacelle			526	001-100,
Abnormal Operations			527	001-100,
No Start			527	001-100,
Hot Start			527	001-100,
Hung Start			527	001-100,
Overtemperature			527	001-100,
Low or No Oil Pressure			527	001-100,
Scavenge Oil Overtemperature			528	001-100,
Core Engine Overspeed			528	001-100,
Fan Overspeed			528	001-100,
Compressor Stall			528	001-100,
Engine Flameout			528	001-100,
Engine Failure			529	001-100,
Prepare for Run Procedure			530	001-100,

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
Motoring			533	001-100,
Dry Motoring			533	001-100,
Wet Motoring			535	001-100,
Engine Run			537	001-100,
Starting			537	001-100,
Engine Shutdown			540	001-100,
Power Plant Operation (Cold Weather)			541	001-100,
General			541	001-100,
Equipment and Materials			541	001-100,
Procedure for Cold Weather Operation			542	001-100,
Operate the Engine			542	001-100,
Put the Aircraft Back to Serviceable Condition			544	001-100,
Adjustment/Test			545	001-100,
Idle Adjustment/Test			545	001-100,
Operation Above Idle			554	001-100,
Accel Check (optional)			589	001-100,
HP Compressor (N2) Rotor Manual Cranking			592	001-100,
Replacement Engine Test (Untested)			597	001-100,
General Procedures if an Engine Fire Occurs During Ground Operation			A504	001-100,
Procedure if an External Engine Fire Occurs During Ground Operation with the Engine Cowls Closed			A505	001-100,
Procedure if an Engine Fire Occurs During Ground Operation with the Engine Cowls Open or Removed			A507	001-100,
Procedure if an Internal Fire Occurs in an Engine that is Stopped			A508	001-100,
Procedure if there is an Internal Engine Fire, a Tail Pipe Fire or High EGT During Ground Operation			A509	001-100,
COWLING	71-10-00			
Description and Operation			1	001-100,
General			1	001-100,
NOSE COWL	71-11-00			
Description and Operation			1	001-100,
General			1	001-100,
Description			1	001-100,
Nose Cowl Anti Icing			1	001-100,
Removal/Installation			401	001-100,
Inspection/Check			601	001-100,

Printed in France

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
COWL DOORS	71-13-00			
Description and Operation			1	001-100,
Fan Cowl Doors			1	001-100,
Fan Reverser			7	001-100,
Core Cowl Doors			18	001-100,
Servicing			301	001-100,
Fan Cowl Door Opening and Closing			301	001-100,
Thrust Reverser Cowl Door Opening and Closing (Hydraulic Method)			302	001-100,
R Thrust Reverser Cowl Door Opening and Closing (Sling Method)			308	001-100,
Core Cowl Door Opening and Closing			310	001-100,
CORE COWL	71-13-01			
Removal/Installation			401	001-100,
Adjustment/Test			501	001-100,
Inspection/Check			601	001-100,
FAN COWL	71-13-02			
Removal/Installation			401	001-100,
Adjustment/Test			501	001-100,
Inspection/Check			601	001-100,
FAN REVERSER COWL	71-13-03			
Removal/Installation			401	001-100,
Adjustment/Test			501	001-100,
Procedure			501	001-100,
FAN COWL DOOR HOLD-OPEN RODS	71-13-04			
Removal/Installation			401	001-100,
FAN COWL DOOR LATCH	71-13-05			
Removal/Installation			401	001-100,
Procedure			401	001-100,
Removal			401	001-100,
Installation			401	001-100,
Adjustment			401	001-100,
Inspection/Check			601	001-100,
CORE COWL DOOR LATCHES	71-13-06			
Removal/Installation			401	001-100,
Procedure			401	001-100,
Removal			401	001-100,
Installation			401	001-100,
Adjustment			401	001-100,
Inspection/Check			601	001-100,
CORE COWL DOOR HOLD-OPEN ROD	71-13-07			
Removal/Installation			401	001-100,
FAN THRUST REVERSER MOUNTING RING LATCH ASSEMBLY	71-13-08			
Adjustment/Test			501	001-100,
MOUNTS	71-20-00			
Description and Operation			1	001-100,
General			1	001-100,
Description			1	001-100,
Material			3	001-100,

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
ENGINE FORWARD MOUNT	71-21-00			
Removal/Installation			401	001-100,
INSPECTION/CHECK			601	001-100,
AFT MOUNT	71-22-00			
Removal/Installation			401	001-100,
Inspection/Check			601	001-100,
FIRE SEALS	71-30-00			
Description and Operation			1	001-100,
General			1	001-100,
Description			1	001-100,
ATTACH FITTING	71-40-00			
Description and Operation			1	001-100,
General			1	001-100,
Removal/Installation			401	001-100,
Procedure			401	001-100,
ELECTRICAL HARNESS	71-50-00			
Description and Operation			1	001-100,
General			1	001-100,
Description			1	001-100,
Approved Repairs			801	001-100,
General			801	001-100,
Equipment and Materials			801	001-100,
Wire Replacement			801	001-100,
Inspection/Check of Electrical Harness			802	001-100,
Do a Connector Contact Tension Test			803	001-100,
Wire Splice Repair			803	001-100,
Wire Harness Repair - Limited Rewrap			806	001-100,
ENGINE FAN CASE ELECTRICAL HARNESS	71-51-01			
Removal/Installation			401	001-100,
ENGINE CORE ELECTRICAL HARNESS IDG - SYSTEM	71-52-01			
Maintenance Practices			201	001-100,
Removal/Installation			401	001-100,
ACCESSORY DRIVE ZONE WIRE HARNESS	71-53-01			
Removal/Installation			401	001-100,
ENGINE DRAINS	71-70-00			
Description and Operation			1	001-100,
General			1	001-100,
General			1	001-100,
Operation			1	001-100,
Operation			1	001-100,
Description			6	001-100,
Description			7	001-100,
Maintenance Practices			201	001-100,
General			201	001-100,

SUBJECT	CH/SE/SU	C	PAGE	EFFECTIVITY
Equipment and Materials			201	001-100,
Procedure			201	001-100,
Job Set-Up			201	001-100,
Clear left side junction box oil drain tube :			201	001-100,
Clear right side pylon drain tube			202	001-100,
Clean the drain tubes.			202	001-100,
Close-Up			205	001-100,
Inspection/Check			601	001-100,
ENGINE DRAIN MODULE/MANIFOLD	71-70-21			
Maintenance Practices			201	001-100,
Removal/Installation			401	001-100,
Engine Drain Module			401	001-100,
Removal/Installation			405	001-100,
Engine Drain Manifold			405	001-100,
ENGINE ACCESSORY DRAIN OUTLET MAST	71-70-31			
Removal/Installation			401	001-100,

1. General
The aircraft is powered by two turbofan engines designed for subsonic commercial airline service.
The engine has thrust rating capability in the 50,000 to 59,000 pound range.
Each engine is housed in a nacelle package and suspended from a pylon attached to the wing lower surface.

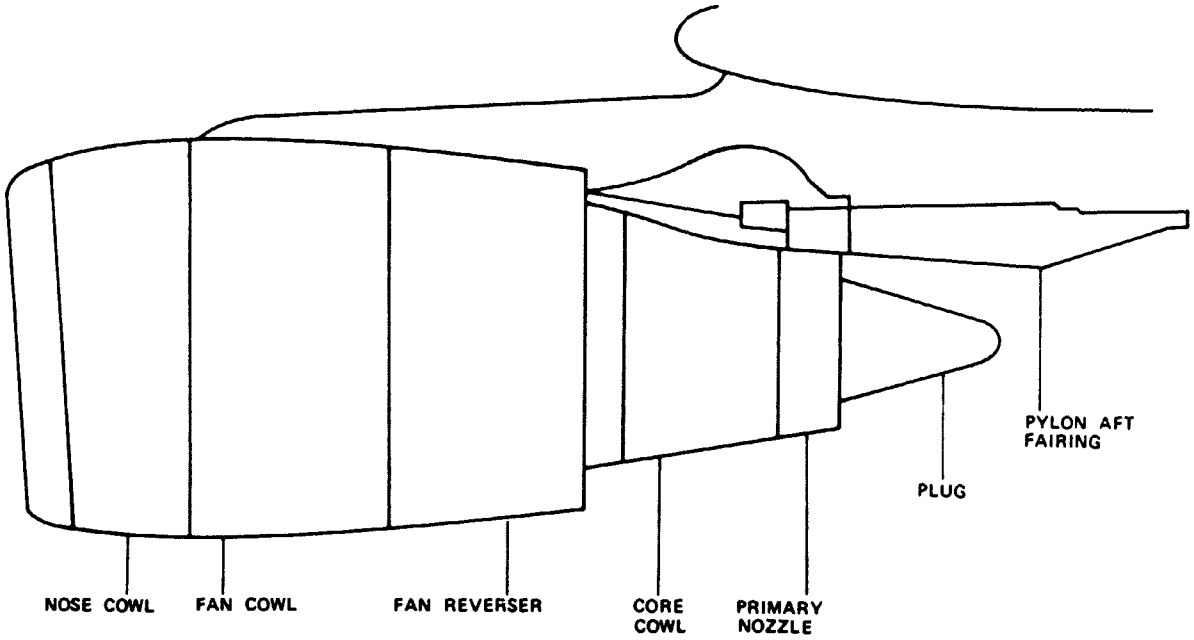
2. Cowling
(Ref. Fig. 002)
(Ref. Fig. 001, 003)
The cowling which encloses the engine comprises fixed, hinged and translating cowls. The right and left engine cowls are interchangeable except the fan reverser cowls. The cowling assembly consists of the nose cowl, fan cowl, fan reverser and core cowl. The exhaust nozzle completes the cowling and is covered by chapter 78-10.
The hinged cowls are attached to the pylon. They are hinged at the upper part by three hinges. They are held open by hold-open rods, providing access to the engine for maintenance, rigging, trouble shooting or installation/removal.

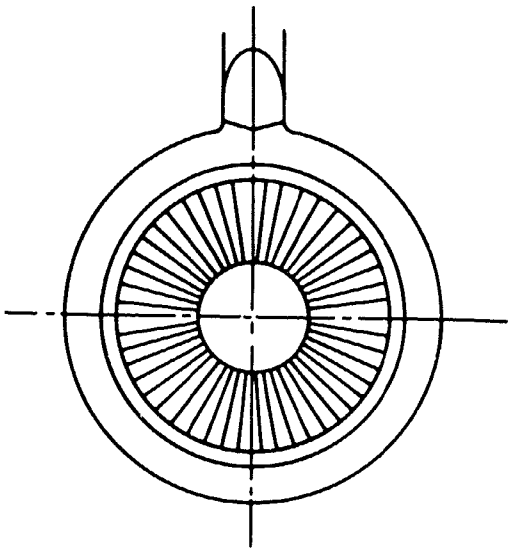
3. Mounts
The engine is connected to the pylon by two safe life mounts. The engine mounting system consists of main engine attaching structures (forward and aft) plus additional nacelle structural elements that are located on other load paths between the engine and aircraft pylon. The forward mount comprises five attach bolts that connect the engine directly to the pylon. The aft mount consists of a link and beam system attaching the engine to the pylon.

4. Fire Seals
The fire seals are fire protections between the engine compartments. The fire seals separate the space within the engine into compartments in order to provide the best possible means of isolation to limit propagation of any fire which may occur and to limit airflow to a compartment where a fire is present to allow the extinguishing equipment to work.

5. Attachment Fittings
The attachment fittings and support brackets ensure the attachment of components, ducts, pipes and electrical cables on the engine.
The attachment fittings and support brackets are attached on the engine periphery, to the cases, accessories and accessory gearbox.

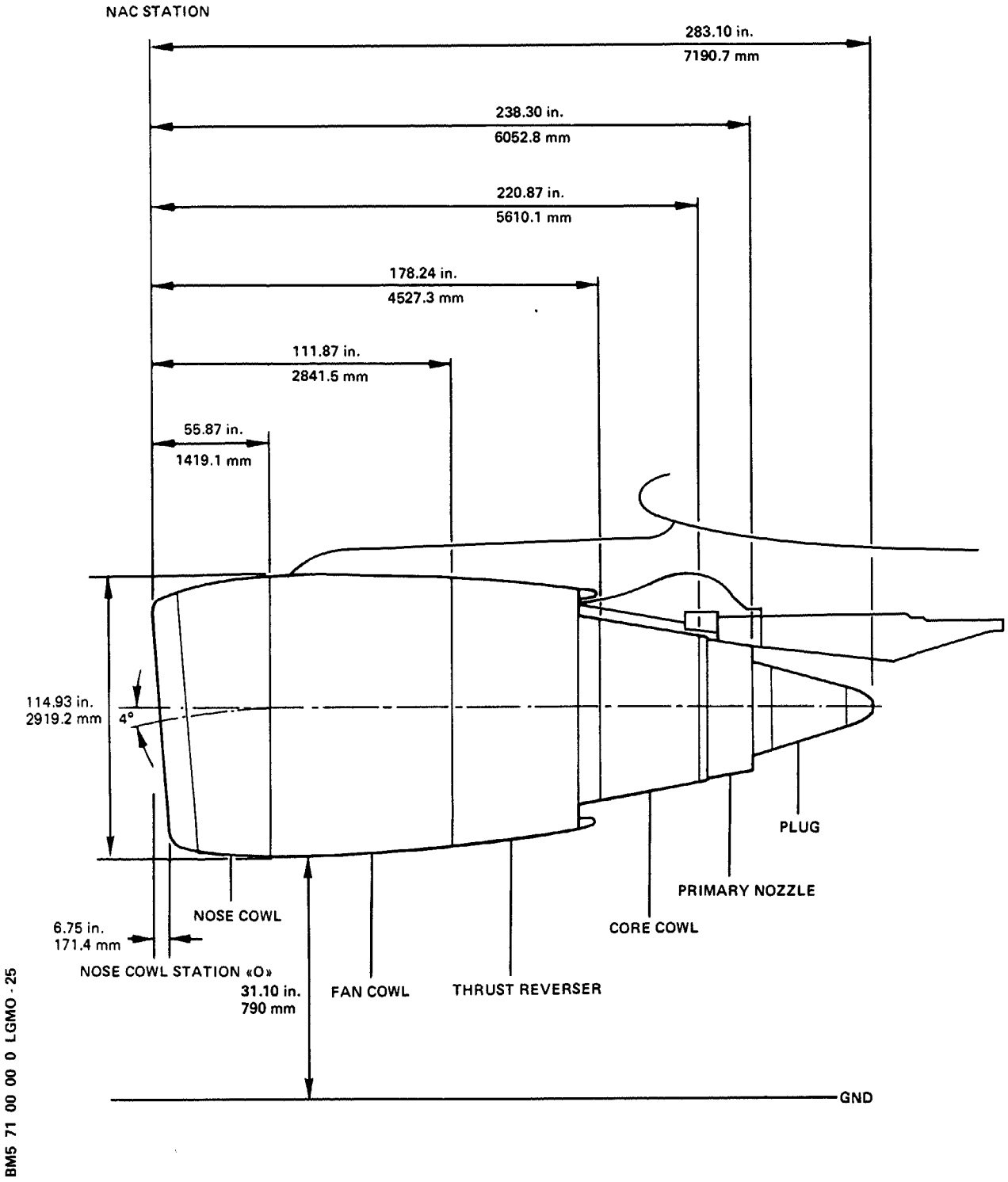
6. Electrical Harness
The engine electrical harness interconnects wiring between the electrical components mounted in the nacelle and the pylon.
It distributes the power required by the aircraft electrical system and transmits signals for nacelle sub-systems and engine control and monitoring functions.



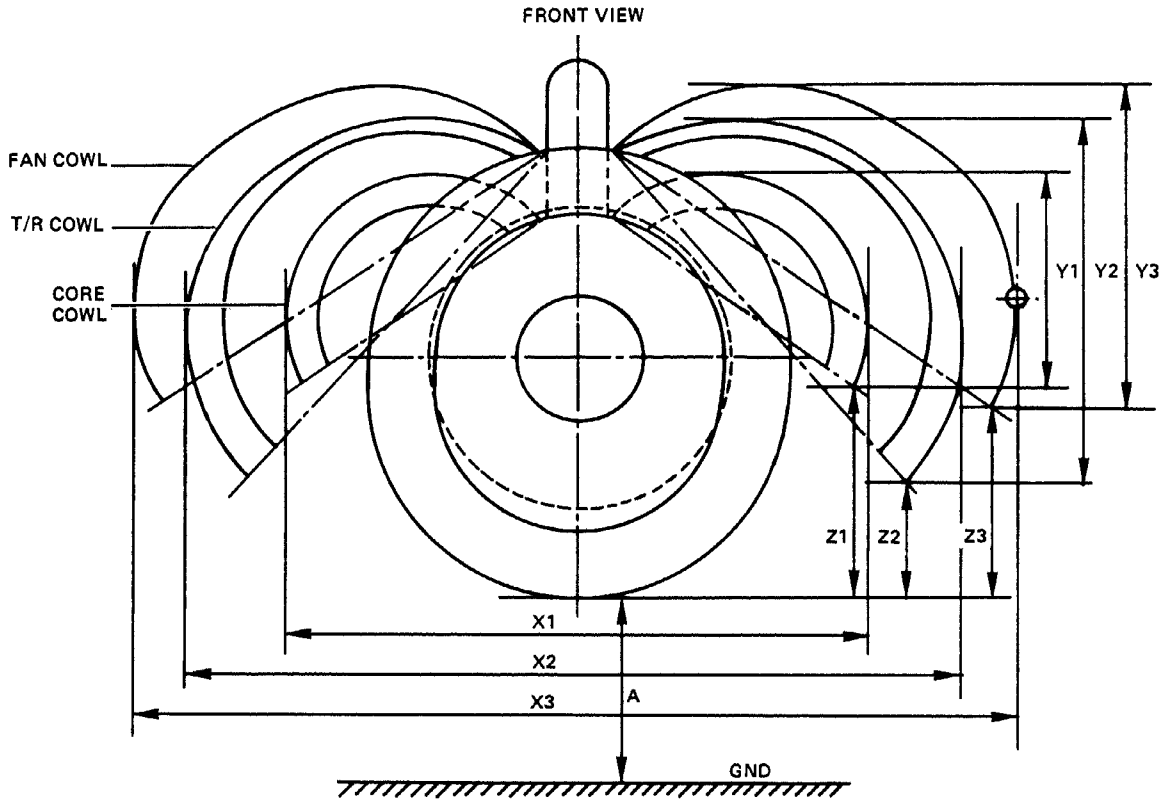


BM5 71 00 00 0 LAMO 13.07
DM5

Nacelle
Figure 001



Nacelle Dimensions
Figure 002



DIMENSIONS ≃										
	X1	X2	X3	Y1	Y2	Y3	Z1	Z2	Z3	A
MM	3200	4500	5120	1450	2470	2340	1120	450	830	800
IN.	125.98	177.16	201.57	57.08	97.24	92.12	44.10	17.71	32.67	31.49

NOTE: DIMENSIONS IN THE TABLE ABOVE ARE APPROXIMATE.

BM5 71 00 00 0 LJMO - 28 - 23
DM5

CF6-80C2 - Power Plant Dimensions.
Figure 003

7. Engine Drains

The drain and vent system consists of lines collecting and carrying waste fluids and vapors overboard from the accessories, nacelle and pylon cavities.

1. General

WARNING : BEFORE ATTEMPTING MAINTENANCE OPERATIONS ON THE FUEL SYSTEM MAKE CERTAIN THAT FIRE EXTINGUISHING EQUIPMENT IS READILY AVAILABLE IN PROXIMITY TO WORK AREA.

CHECK THAT LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.

IN ORDER TO AVOID DAMAGE TO LINES, PNEUMATIC DUCTS AND ELECTRICAL CONNECTORS AND TO PREVENT COMTAMINATION BY FOREIGN BODIES, BLANK OFF THE LINES, DUCTS AND CONNECTORS WITH PROTECTIVE CAPS.

WARNING : BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTENT OPERATION OF CONTROLS.

BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

BEFORE PRESSURIZING HYDRAULIC SYSTEMS, MAKE CERTAIN THAT HYDRAULIC SYSTEM UNDER MAINTENANCE HAS BEEN ISOLATED.

WARNING : MAKE SURE THAT PYLON AFT HOIST FITTINGS ARE IN GOOD CONDITION BEFORE YOU INSTALL AND AFTER YOU REMOVE THE BOOTSTRAP REAR MAIN BEAM.

WARNING : OBSERVE SAFETY PRECAUTIONS WHEN WORKING ON THE HYDRAULIC SYSTEM. LONG EXPOSURE TO HYDRAULIC FLUID CAN CAUSE SKIN DEHYDRATION AND CHAPPING. REF. 29-00-00.

CAUTION : CHECK AIRCRAFT STABILITY.

R CAUTION : SKINNY CAST YOKE (P/N 9384M43G08 OR 9384M43G09 OR 9384M43G10 OR
R 9384M43G11) CAN ONLY BE INSTALLED IF IT IS ASSOCIATED TO A MOVEMENT
R TRACEABILITY SHEET (MTS) AND IF THIS SKINNY CAST YOKE HAS ACCUMULA-
R TED LESS THAN 7000FC SINCE THE MTS CREATION. IF NO MTS ATTACHED,
R CREATE ONE (TEMPLATE ATTACHED TO THE AOT 71A2036 FOR A310 A/C AND
R AOT 71A6029 FOR A300-600 A/C).

NOTE : Aircraft stability is modified by engine removal. Check aircraft stability (Ref. 05-57-00, P. Block 1) with one or both engines removed before proceeding further.

NOTE : For preservation/Depreservation procedures for engine (power plant) Refer to 72-00-00, P. Block 201.

NOTE : For removal/installation by means of bootstrap device : this procedure is valid with or without the nose cowl. For the nose cowl removal/installation (Ref. 71-11-00, P. Block 401).

2. Equipment and Materials

	ITEM	DESIGNATION
	A. U0787001-500	Bootstrap
	B. SMIG277ETT	Trailer - Engine Storage and Transportation
	or	
	SMIG277ETT2	Trailer - Engine Storage and Transportation
	C. 98A71103506001	Chest - Torque Set
	D. 98A76101003000	Rigging Pin Autothrottle Coupling Unit
	E. 99A76101501000	Rigging Pin
	F.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz, 90 KVA
	G.	Access Platforms
	H.	Blanking Plugs
R	J.	Warning Notices
R	K.	Container
R	L.	Circuit Breaker Safety Clips
R	M.	Corrosion Resistant Steel Lockwire Dia. 0.5 mm (0.02 in.)
R	N.	Corrosion Resistant Steel Lockwire Dia. 0.8 mm (0.032 in.)
R	P. Material No.C02-060	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
R	Q. Material No. 16-001B	Structure Paints (Ref. 20-31-00)
R	R. RSE1071	Spanner Wrench Set
R	S.	Gasket
R	T. SMIG277HP	Hydraulic Positioner
R	U. SMIG277CR80	Cradle
	or	
	S277CR80	Cradle
	or	
	TMHEC08-00-00	Cradle
	T. 98A71101506001	Hold - Open - Fixture - Engine Cowl
	Referenced Procedures	
	- 05-57-00, P. Block 1	Aircraft Stability
	- 12-11-28, P. Block 301	Replenishing of Fuel Tanks
	- 12-12-29, P. Block 1	Replenishing of Hydraulic Tank
	- 12-13-24, P. Block 1	Electrical Power
	- 12-13-79, P. Block 1	Engine Lubricating Oil
	- 20-28-11, P. Block 1	Electrical Bonding
	- 21-51-00, P. Block 301	Air Cooling System
	- 24-11-00, P. Block 501	IDG System
	- 24-25-00, P. Block 501	AC Essential Generation Switching
	- 24-41-00, P. Block 301	AC External Power Control
	- 26-12-00, P. Block 501	Engine Fire and Overheat Detection
	- 29-10-00, P. Block 301	Main
	- 29-14-00, P. Block 301	Hydraulic Fluid Tank Pressurizing System
	- 30-21-00, P. Block 501	Engine Air Intake Ice Protection
	- 36-11-00, P. Block 501	Engine Bleed Air Supply System
	- 54-51-00, P. Block 601	Pylon Box

ITEM	DESIGNATION
- 54-51-85, P. Block 401	Engine Aft Mount Upper Beam
- 54-51-86, P. Block 401	Aft Attach Fitting Shim
- 70-00-00, P. Block 201	Standard Practices - Engines - General
- 71-00-00, P. Block 501	Power Plant - General
- 71-11-00, P. Block 401	Nose Cowl
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-02, P. Block 501	Fan Cowl
- 71-13-03, P. Block 501	Fan Thrust Reverser Cowl
- 71-21-00, P. Block 601	Engine Forward Mount
- 71-22-00, P. Block 601	Engine Aft Mount
- 73-23-00, P. Block 501	Power Management Control
- 75-32-01, P. Block 501	Variable Bypass Valve Actuator
- 76-11-00, P. Block 501	Throttle Control
**ON A/C 001-100,	
- 71-52-01, P. Block 401	Engine Core Electrical Harness
- 71-52-01, P. Block 201	Engine Core Electrical Harness
**ON A/C 001-100,	
- 76-11-41, P. Block 401	Flexible Control

3. Procedure

A. Job Set-Up

(1)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(2)Make certain that electronics racks ventilation is correct.

(3)On flight compartment overhead panel, pull the appropriate engine fire handle and install a warning notice to prohibit handle actuation to normal (pushed) position while maintenance procedures are in progress.

(4)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

NOTE : Aircraft electrical network can stay energized if necessary. However, a correct electronics rack ventilation cannot be ensured by blowers at high speed when both engines are removed. In this case, electronics rack ventilation must be ensured by HP pneumatic ground air source.

(5)On panel 133VU, open, safety and tag all circuit breakers related to engines together with the following ones.

For Engine 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H8 thru H10
21VU	AIDS		105/E2 thru E5
21VU	ECAM - NAVIGATION - ELEC		108/B1 thru B13
21VU	SDAC - FWC2 STICK SHAKR		109/A2 thru A5 and A8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG 1 & 2/SQUIB B		207/C19 thru C20
133VU	ELEC/GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57
133VU	FIRE EXTING/ENG 1 & 2/SQUIB A		335/R71 thru R72

For Engine 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1 /CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP ENG 1 VALVES/HP/BLEED		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG1	3DN	322/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/V57 thru V58
133VU	FIRE VALVES/ENG 1	101GK	334/S57
133VU	HP FUEL SHUT OFF VALVE	3KC	333/T69
133VU	ENG1/REV/CTL	1KM	332/U69
133VU	ENGINES/ENG1/OIL QTY	1FN	336/Q68
133VU	ENG1/OIL PRESS	5ES	336/Q70

PANEL	SERVICE	IDENT.	LOCATION
131VU	AIR BLEED & COMPT TEMP/ENG2/VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG2/HP/WARN		312/G53 thru G54
131VU	AIR BLEED & COMPT TEMP/ENG2/CONTROLLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG2	28DN	322/N71
133VU	ENG2/HYDRAULIC PUMP CTL		332/U57 thru U58
133VU	FIRE VALVES/ENG2	103GK	334/558
133VU	HP FUEL SHUT OFF VALVE	4KC	333/T70
133VU	ENG2/REV/CTL	2KM	331/V74
22VU	ENG FIRE DETECTION		209/A22 thru A24
133VU	ENGINES/ENG2/OIL QTY	2EN	336/Q73
133VU	ENG2/OIL PRESS	6ES	336/Q71

(6)On panel 9VU
- place the throttle control levers at forward idle thrust position.

(7)Place rigging pin PN 98476101003 in autothrottle coupling unit.

R (8)Open the fan cowls (Ref. 71-13-00, P. Block 301) and maintain them open
R with the hold open rods.

R (9)Open the fan thrust reverser cowls (Ref. 71-13-00, P. Block 301) in
R the maximum open position. Maintain them open with the hold open rods.

R (10)Position access platform.

NOTE : The variable bypass valve (VBV) doors should be pumped closed anytime maintenance is being performed in the area. This avoids the possibility of foreign objects entering the core inlet through the VBV doors.

R (11)Close the VBV doors if necessary (Ref. 75-32-01, P. Block 501).

R (12)Blank off generator cooling duct.

CAUTION : DO NOT OPEN THE COWL DOORS FOR ENGINE. REMOVAL IF THE GROUND WIND VELOCITY IS MORE THAN 20 KNOTS.
HIGHER WIND VELOCITIES CAN BREAK OR CAUSE DAMAGE TO THE DOORS AND/OR THE COWL HOLD-OPEN BRACE.

R (13)Install cowl hold-open brace (Ref. Fig. 401)

R (a)On the tie-rod (detail A) make certain that the guide screw (2), the
R 6 grub screws and the 6 knurled nuts of the support assy do not hinder
R extension of the mobile support (3).

R (b)Install stay assy (1) on each side of engine pylon. Secure with 2 bolts on thrust reverser cowl (Detail A).

R (c)Adjust the mobile support (3) to the correct length. Make certain that
R the mobile support is correctly positioned on the thrust reverser
R centering device.

R WARNING : MAKE CERTAIN THAT THE FAN THRUST REVERSER COWLS ARE HELD OPEN
R BY THEIR HOLD-OPEN RODS BEFORE ACCOMPLISHING THE STEP BELOW.

R (d)Release the hydraulic pressure from the fan thrust reverser opening
R actuator.

R NOTE : The pressure must decrease slowly so that the operator can
R easily guide the pad on the pylon.

R (e)Screw the guide screw (2) and tighten the 6 grub screws and the 6

knurled screws.

(f)Disconnect the hold-open rods of the fan thrust reverser cowls from the engine.

(g)Open the core cowls (Ref. 71-13-00, P. Block 301).

(h)Install tube assy junction (4), (5) on thrust reverser halves

- On the L side, by attaching picking fitting, using the hook latch on the thrust reverser half (Detail F).
- On the R side by attaching the pick up fittings, using the hooks on the thrust reverser half clevis (Detail D).

NOTE : Adjust tension between hooks and clevis fittings if necessary using adjusting nuts.

R (j)Attach fan cowl fittings :

- On the L side using the hook latch on the fan cowl (Detail C).
- On the R side insert the hook in the fitting and install pin (Detail E).

R (k)Attach core cowl fittings

- On the L side insert the hook in the fitting and install pin (Detail E).
- On the R side use the hook latch on the core cowl (Detail C).

(14)Place core and fan cowls support telescopic rods in their stowage position.

(15)Depressurize Green and Blue (Green and Yellow) hydraulic tanks (Ref. 29-14-00, P. Block 301).

(16)Depressurize Green and Blue (Green and Yellow) hydraulic systems (Ref. 29-10-00, P. Block 301)

(17)Drain any fuel remaining in engine fuel system by draining off at level of fuel pump as follows :

(a)Place a container under the pump.

(b)Remove drain plug from pump lower part. Drain fuel into container.

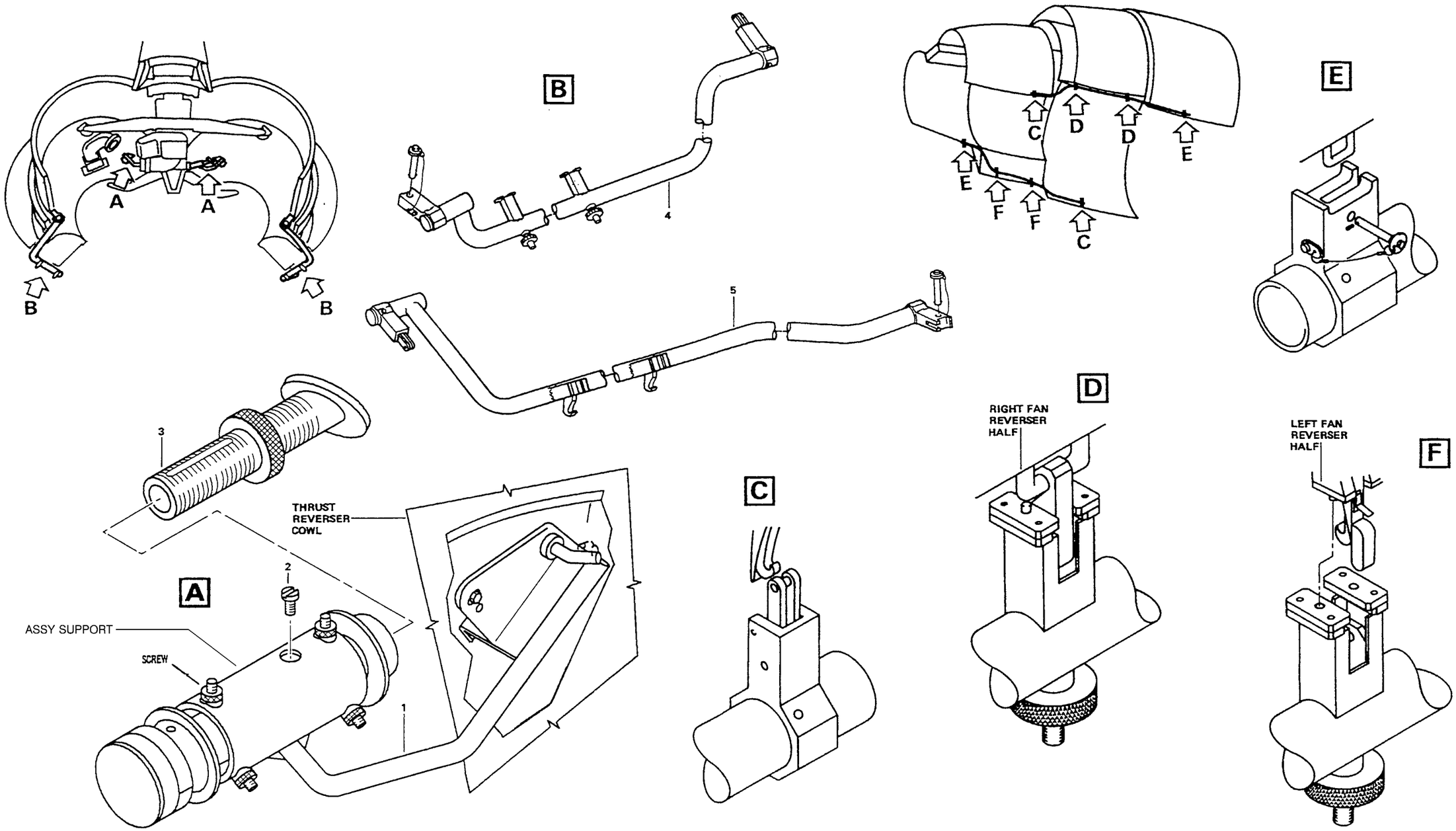
(c)Install drain plug.

(18)At forward mount, remove lockplate and remove spigot attachment bolt and sleeve. (Ref. Fig. 402)

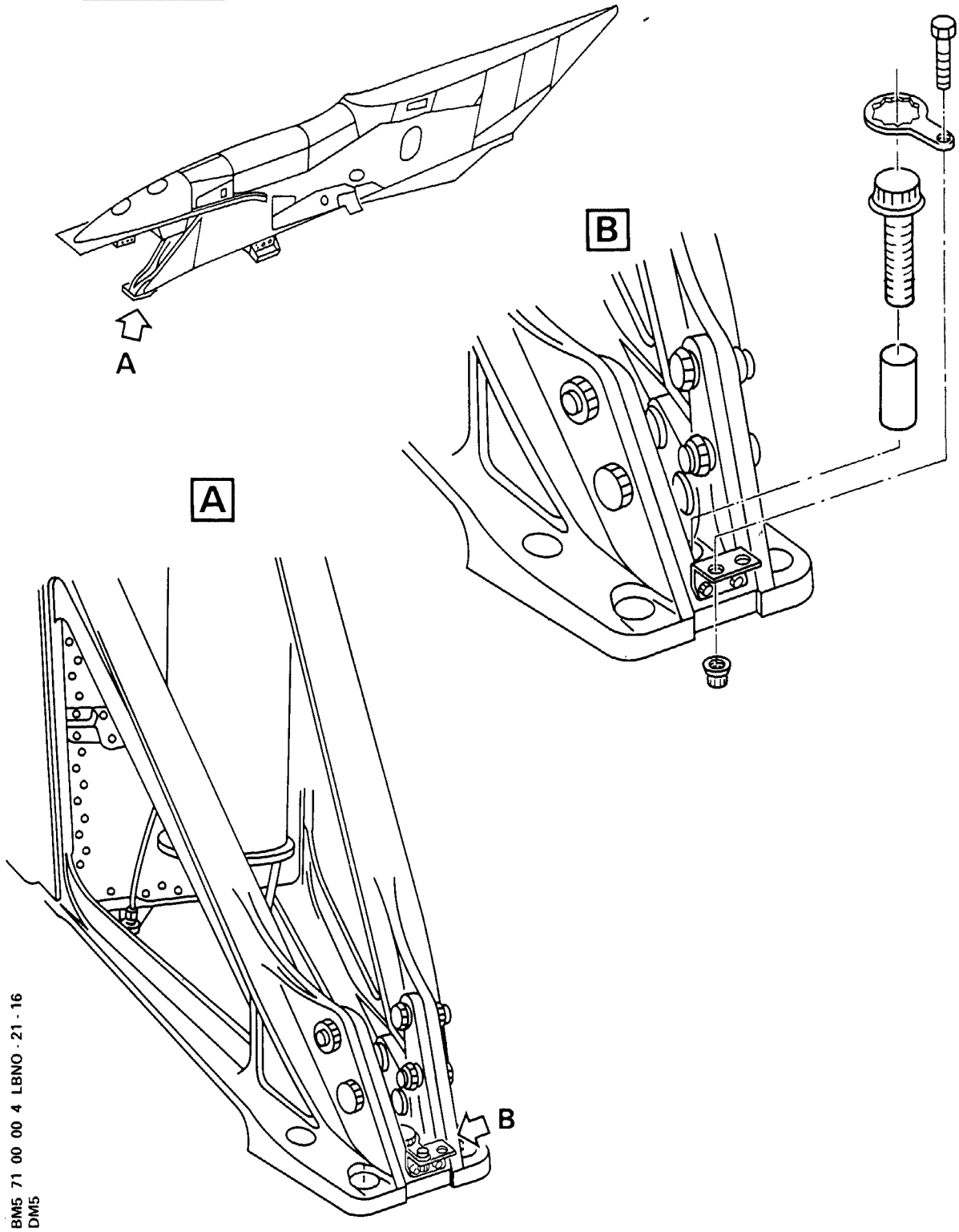
(19)On panel 436VU :

- Make certain that APU bleed load valve control switch (40HB) is in CLOSE position and install a warning notice to tell persons not to use it.
- Make certain that X BLEED VALVE control switch (39HB) is in CLOSE position and install a warning notice to tell persons not to use it.

(20)Make certain that a warning notice is installed on the HP ground connector to tell persons not use it.



Installation of Cowl Hold-Open Brace
Figure 401



Forward Mount - Spigot Attachment Bolt
Figure 402

B. Disconnection of Engine Pylon/Engine Junctions

(1)Disconnect electrical connectors VC4952P, VC4955P,VC4950P, from pylon fan case junction box. (Ref. Fig. 403)

**ON A/C 001-100,

(2)Remove the TRAS Lock System power cable from the fan case (Ref. Fig. 404).

(a)Disconnect the TRAS Lock System power cable from the pylon fan case junction box.

(b)Remove the screws, washers, nuts and clamps that attach the TRAS lock system power cable to the fan case.

(c)Attach the TRAS Lock System power cable to the thrust reverser cowl to prevent fouling with the engine or tools during the engine removal/installation.

(3)Disconnect core wire harnesses from the pylon.

**ON A/C 001-100,

(a)Disconnect electrical power harness (Ref. Fig. 405) as follow.

1 Remove electrical power harness from engine core (Ref. 71-52-01, P. Block 401, Para. B.(1)).

2 Attach the electrical power harness onto the thrust reverser cowl to prevent fouling with the engine or tools during the engine removal/installation.

**ON A/C 001-100,

(b)Disconnect electrical connectors VC4959P, VC4968P, VC4963P, VC4961P, VC4962P, and VC4969P from pylon junction box. (Ref. Fig. 406)

(c)Disconnect electrical connectors VC4960P (if equipped), VC4967P, VC4965P, VC4970P and VC4966P from pylon junction box. (Ref. Fig. 407)

(d)Disconnect the thrust reverser opener hydraulic line quick disconnect. Put caps on the line and connector (Ref. Fig. 408).

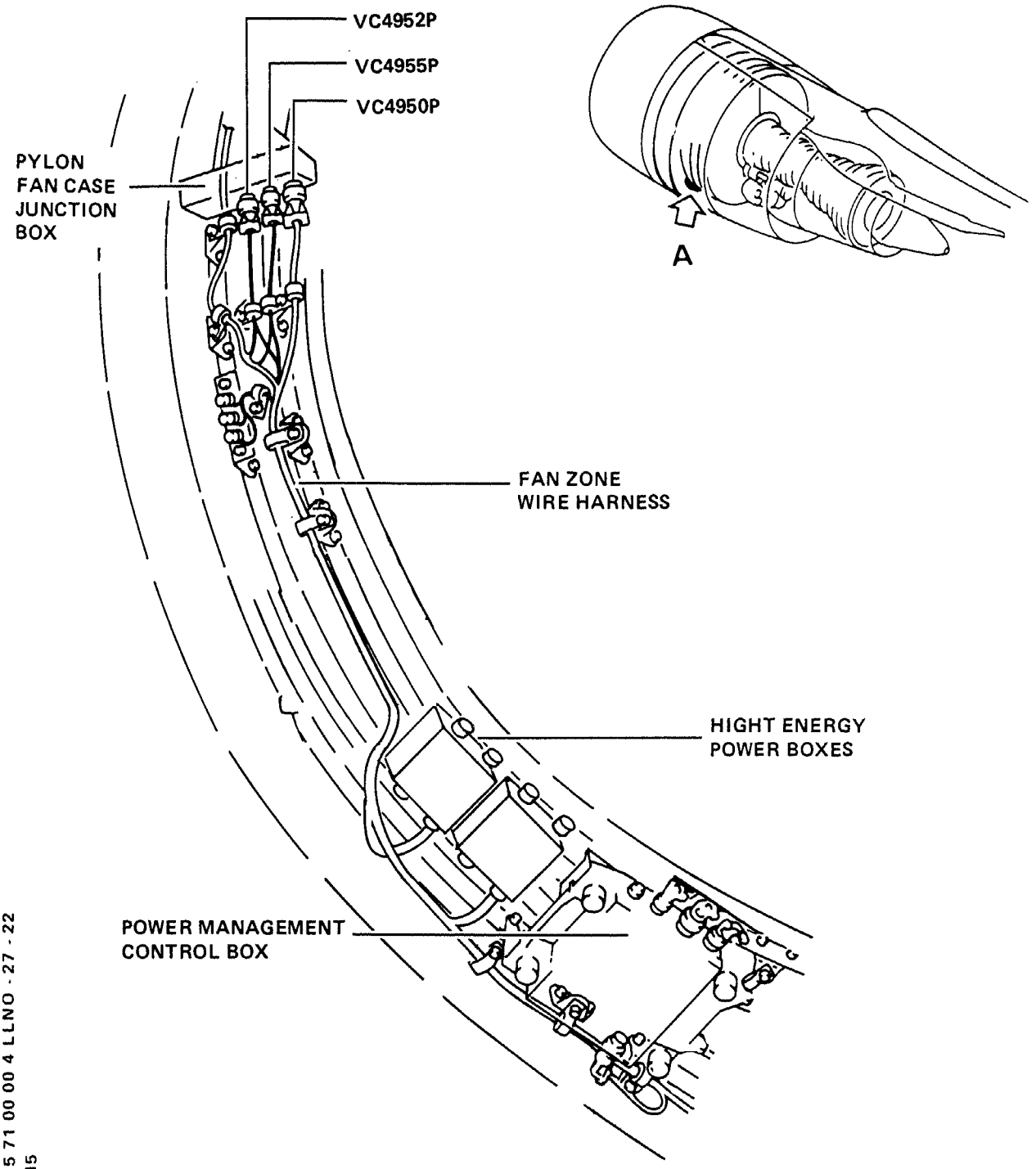
(e)Remove quick disconnect brackets from both sides of pylon.

**ON A/C 001-100,

(4)Disconnect fan case anti-ice ducts.

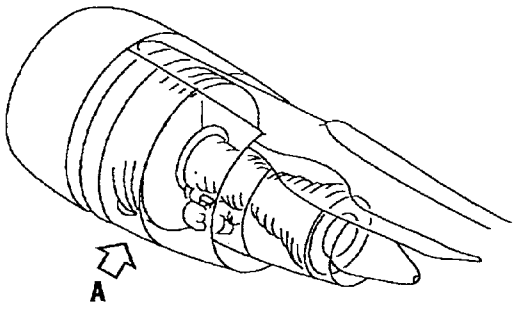
(a)Remove coupling and seal connecting fan case forward duct to housing (Ref. Fig. 409)

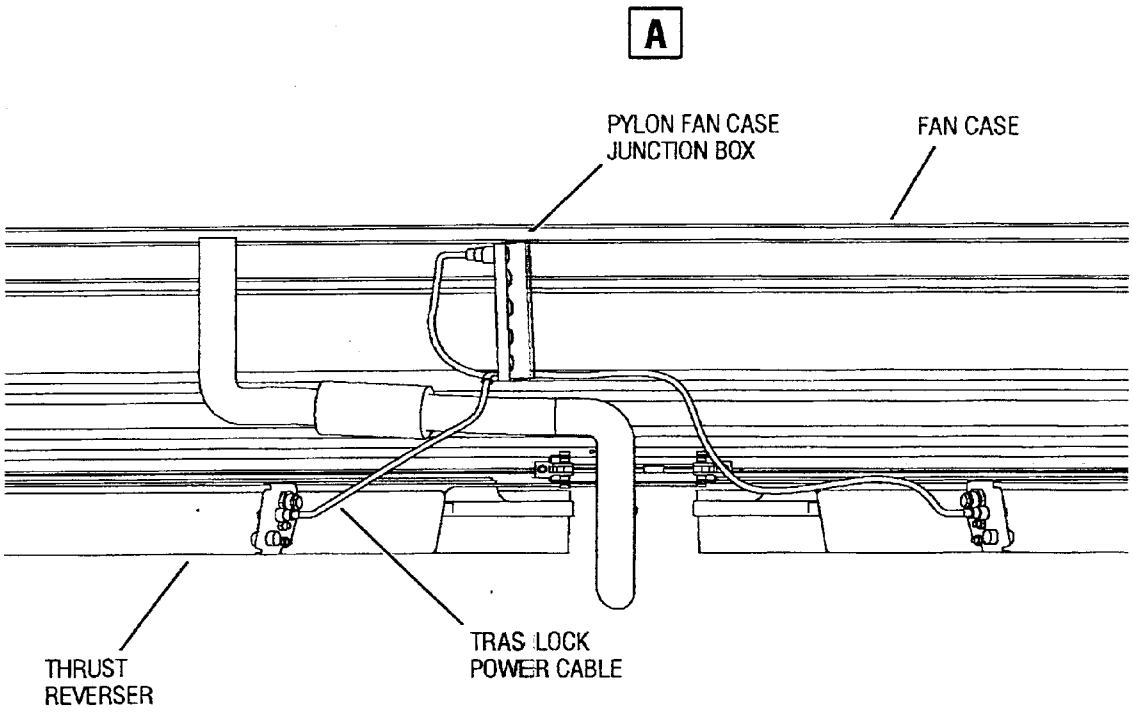
(b)Slide housing onto fan case aft duct.



R

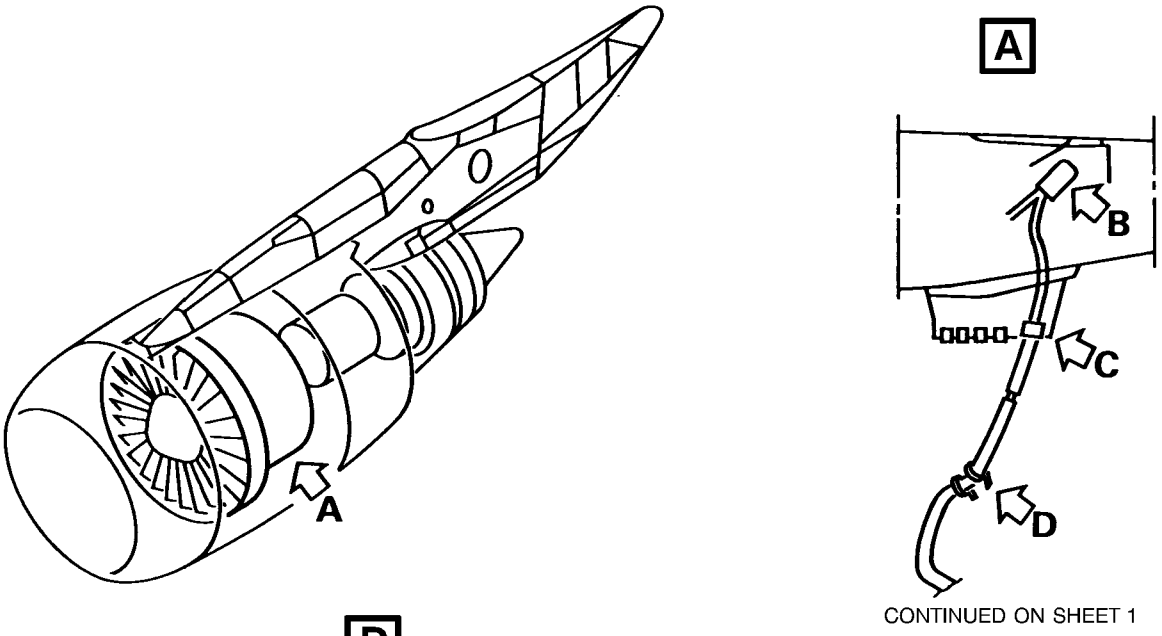
Fan Zone Wire Harness Disconnect
Figure 403

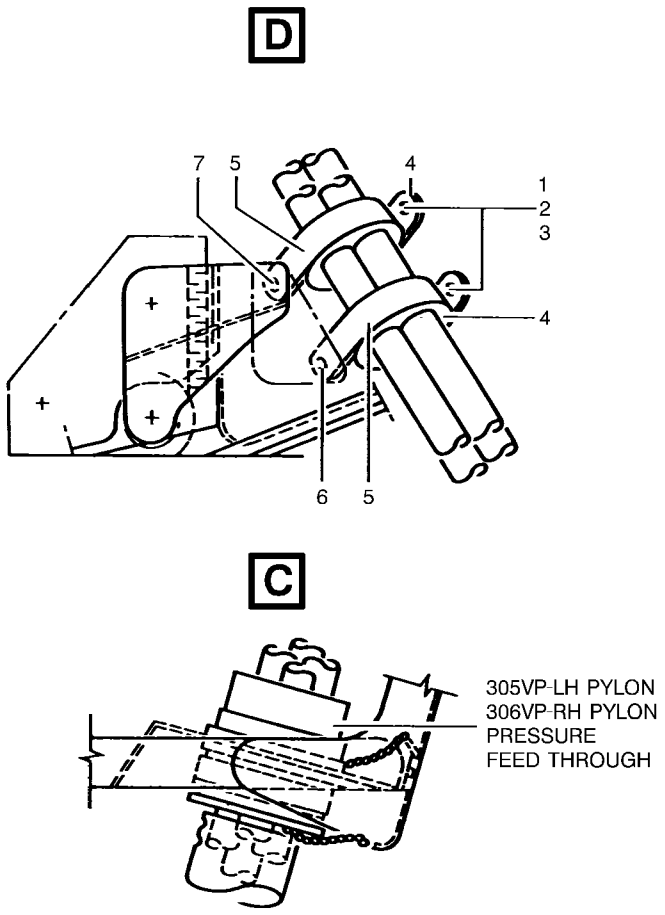




BM5 71 00 00 4 LMNO 00

TRAS Lock System Power Cable
Figure 404

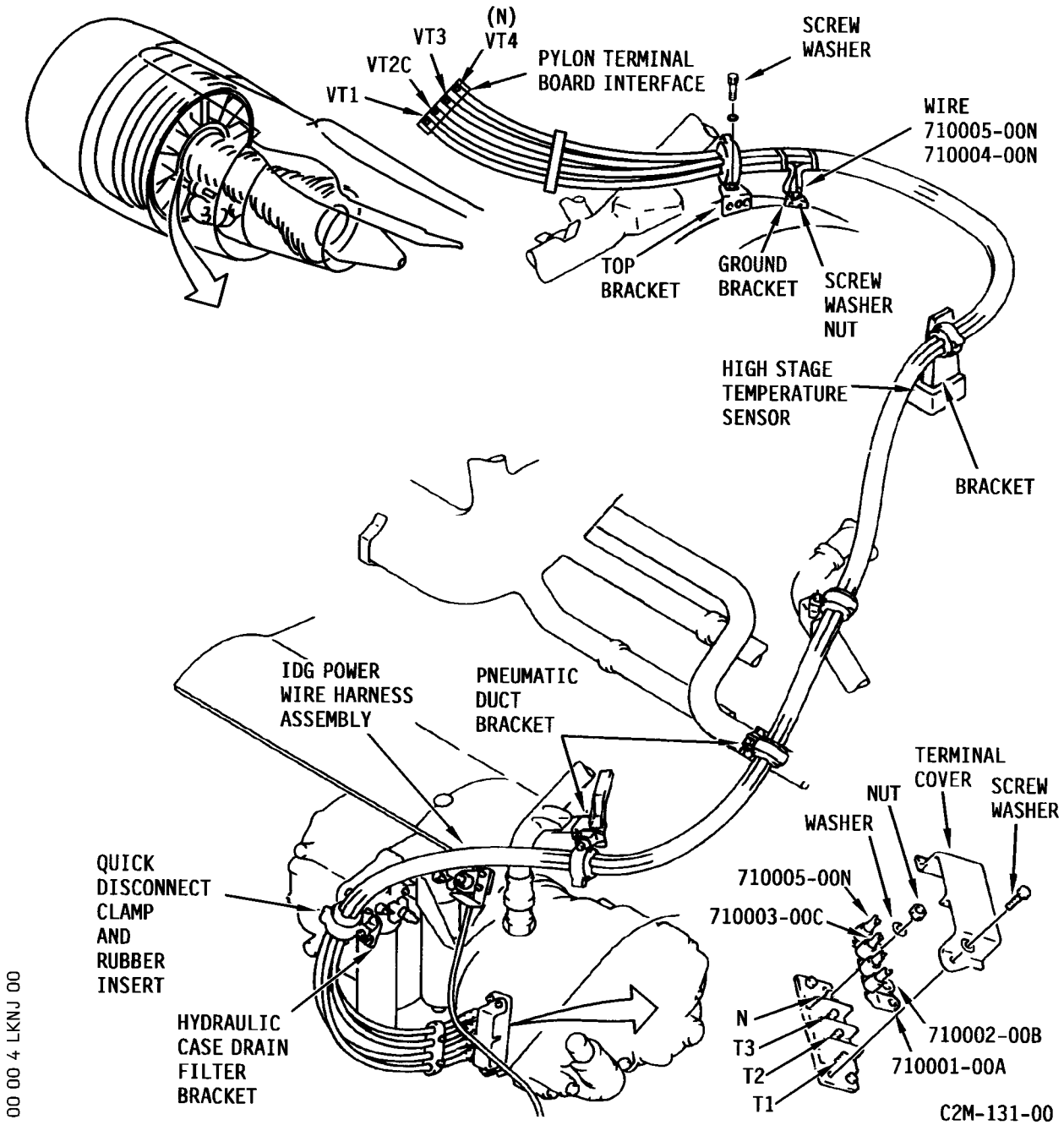




BM5 71 00 00 4 LKNA 00

IDG Power Feeder Harness (Sheet 1/2)
Figure 405

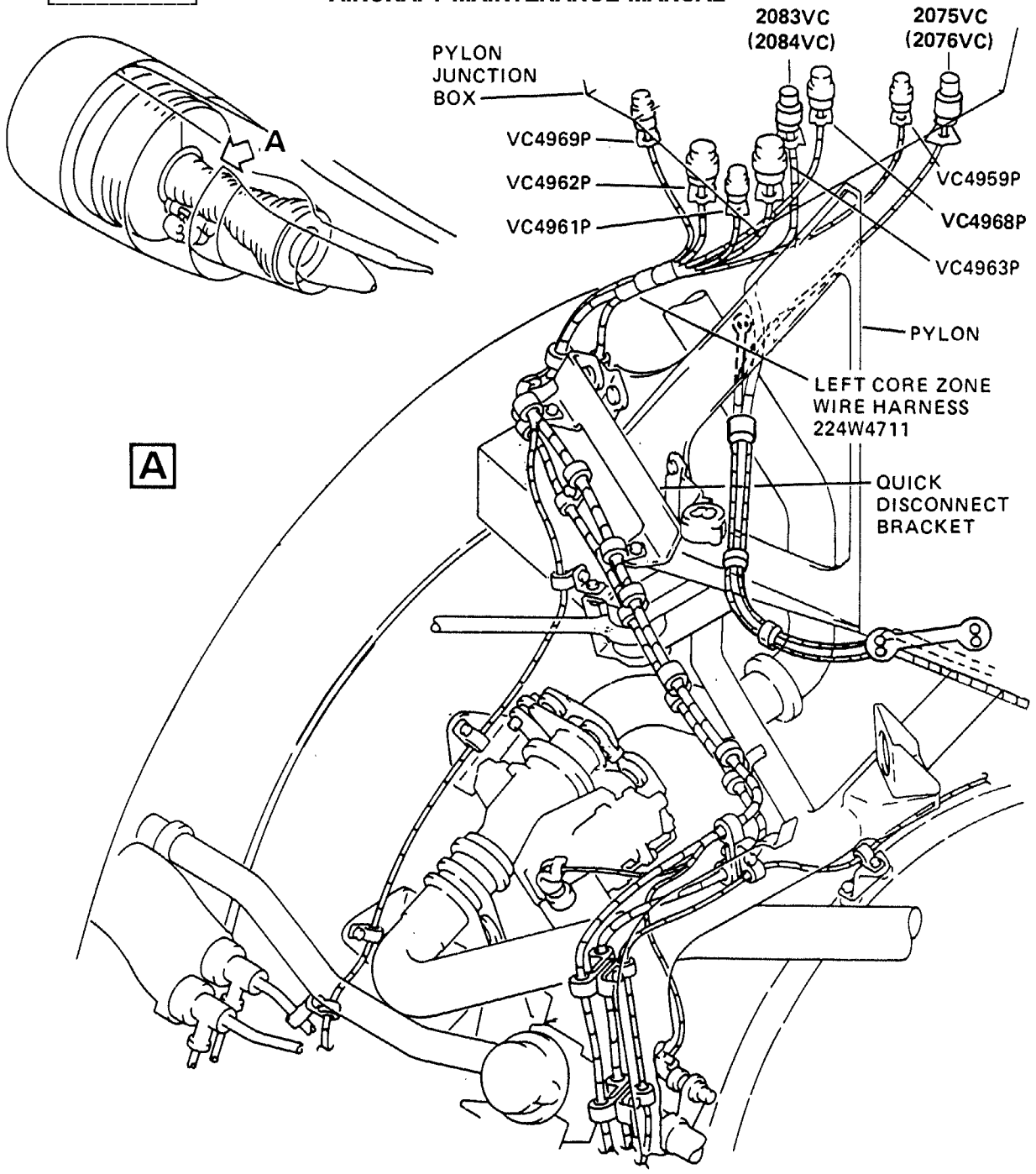
R



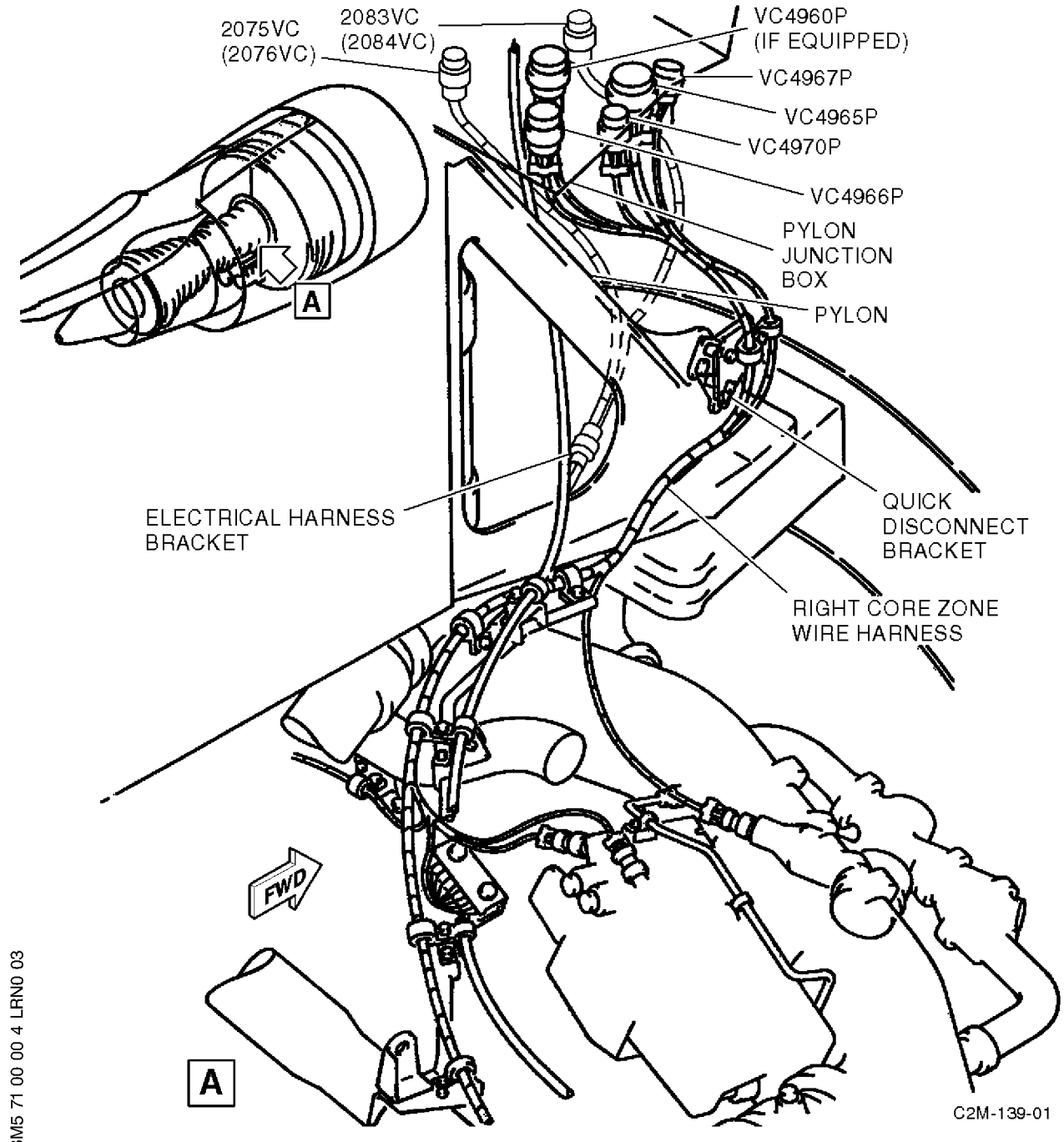
BM5 71 00 00 4 LKNJ 00

IDG Power Feeder Harness (Sheet 2/2)
Figure 405

R

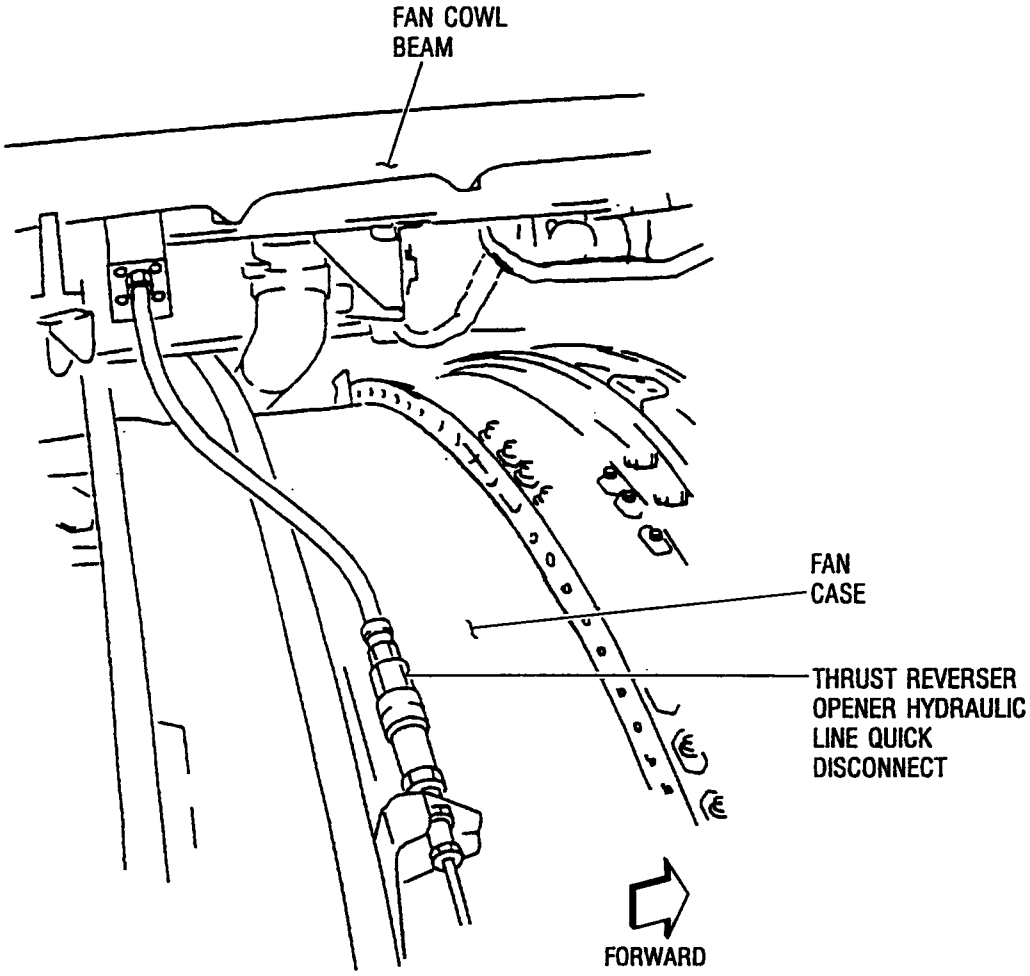


Left Core Zone Wire Harness Disconnect
Figure 406



BM5 71 00 00 4 LRN0 03

Right Core Zone Wire Harness Disconnect
Figure 407



BM5 71 00 00 4 LDMO 00

1130615-00-A

Thrust Reverser Opener Hydraulic Line
Figure 408

(c)Disconnect retaining nuts from union using spanner set RSE1071.
(d)Remove union and seals from duct.
(e)Allow union to remain secured to fan case forward duct by lanyard.
(5)Remove core anti-ice ducts.
(a)Remove couplings and seal connecting bifurcation duct to fan case aft duct in fireseal adapter. (Ref. Fig. 410)
(b)Remove couplings and seals connecting upper bifurcation duct to engine mount duct and engine mount duct to anti-ice valve outlet duct.
(c)Remove ducts.
(6)Disconnect hydraulic hoses from pylon interface and disconnect hydraulic junction box drain hose. (Ref. Fig. 411)
CAUTION : AS HYDRAULIC PUMP PRESSURE AND CASE DRAIN HOSES ARE DISCONNECTED AT PYLON/ENGINE HYDRAULIC INTERFACE, IT IS TO BE NOTED THAT A SMALL AMOUNT OF FLUID MAY FLOW FROM PYLON SIDE. MAKE CERTAIN THAT FLOW STOPS RAPIDLY. IF THIS IS NOT THE CASE, CHECK VALVE SHOULD BE SUSPECTED AND REPLACED.
CAUTION : TO AVOID A FLUID SPILL ON THE ENGINE FOLLOWING DISCONNECTION OF THE HYDRAULIC JUNCTION BOX DRAIN HOSE, ATTACH A COLLECTOR BOTTLE OR PLUG DRAIN UNTIL DRAIN HOSE IS INSTALLED.
(7)Remove thrust reverser ducts.
(a)Remove couplings and seals connecting upper supply duct to fireseal adapter, and lower supply duct. (Ref. Fig. 412)
(b)Remove duct.
(c)Disconnect the TLOD supply tube from the Y-Check Valve (Ref. Fig. 413).
(d)Disconnect the TLOD supply tube at the pylon connection and remove the TLOD tube.
(e)Remove coupling and seal connecting lower supply duct to regulator duct.
(f)Remove duct.
(8)Remove coupling that connects pneumatic interface duct to pylon duct (Ref. Fig. 414)
NOTE : To prevent damage to the interface duct bellows while the engine is lowered, loosen/remove the parts :
- coupling that connect interface duct to regulator valves.
- coupling that connect interface duct to starter air supply duct
- regulator servo-line union connected to interface duct.
This will permit free-play to the interface duct and clear the bellows from electrical harness bracket.
(9)Disconnect hydraulic pressurization hose from Engine 1. (Ref. Fig. 415)

**ON A/C 001-100,

(10)Remove bolts and washers that attach main fuel supply hose to pylon. (Ref. Fig. 416)
(a)Remove hose from pylon and discard gasket.
(11)Remove throttle control cable (Ref. Fig. 417)
(a)Remove access panels 414 ER (424 ER).
(b)Insert rigging pin 99A76101501 through the primary transmission crank lever. (Ref. Fig. 421)

(c)Disconnect throttle control cable from the throttle control box rod and remove throttle cable cooling shroud (Ref. 76-11-41, P. Block 401).

(d)Remove the screws, washers, nuts, and clamps (seven places) that attach the throttle cable to the engine.

(e)Remove the upper coupling bellows. Do not move the remaining throttle control cable bellows.

(f)Remove the throttle control cable from the quick-disconnect clamps (two places) and keep the cable in a safe location.

(12)Disconnect pneumatic sense hoses from pylon. Also, disconnect the fan air valve hose from fan air valve. Disconnect pylon drain hose and lower gearbox extinguishing hose. (Ref. Fig. 418, 419)

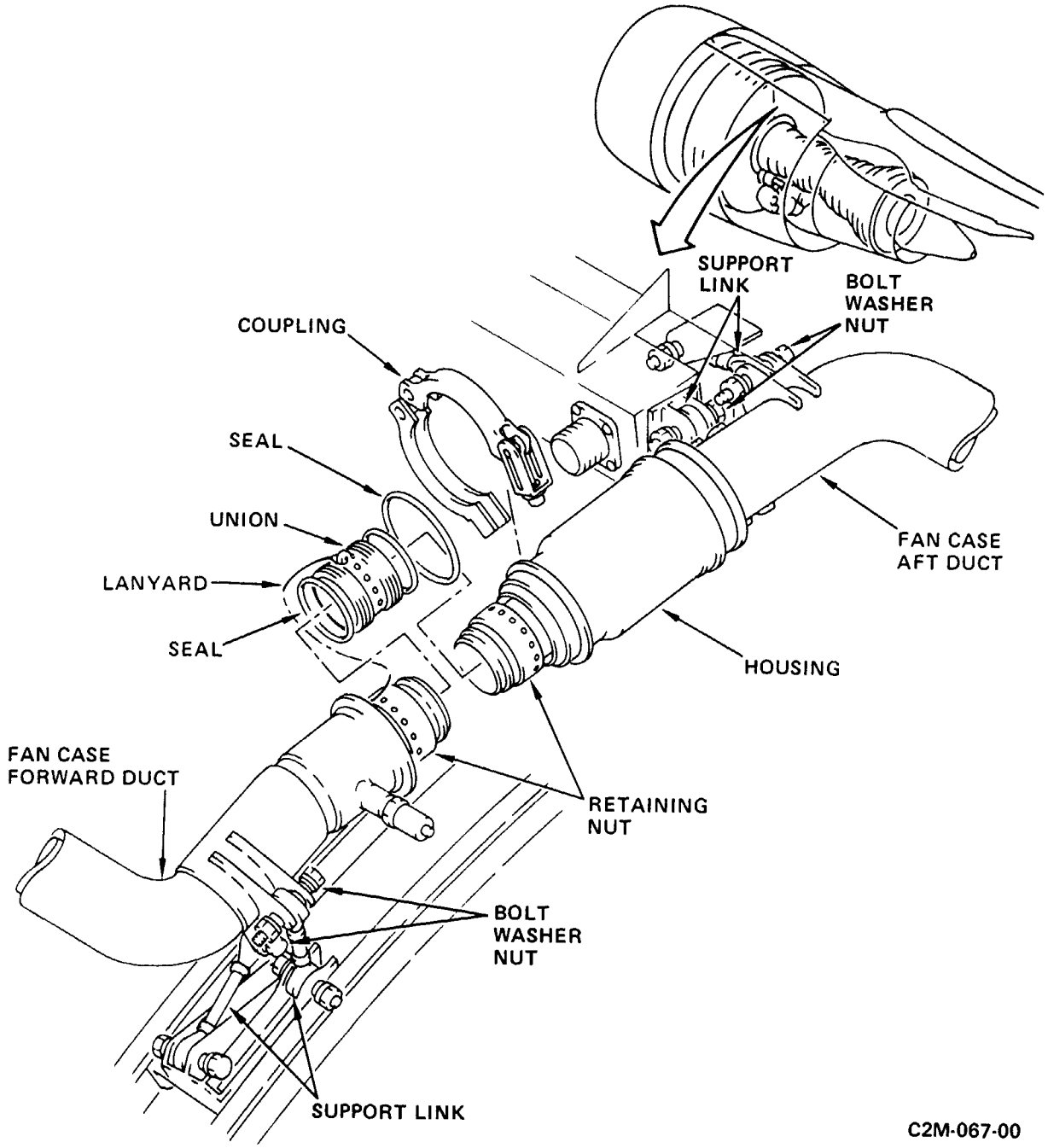
(13)Remove connector from fan air valve 51HA (52HA).

(14)Install protective covers on hoses and open ducts.

R (15)Remove panels 475BL (485BL) and 476BR (486BR).

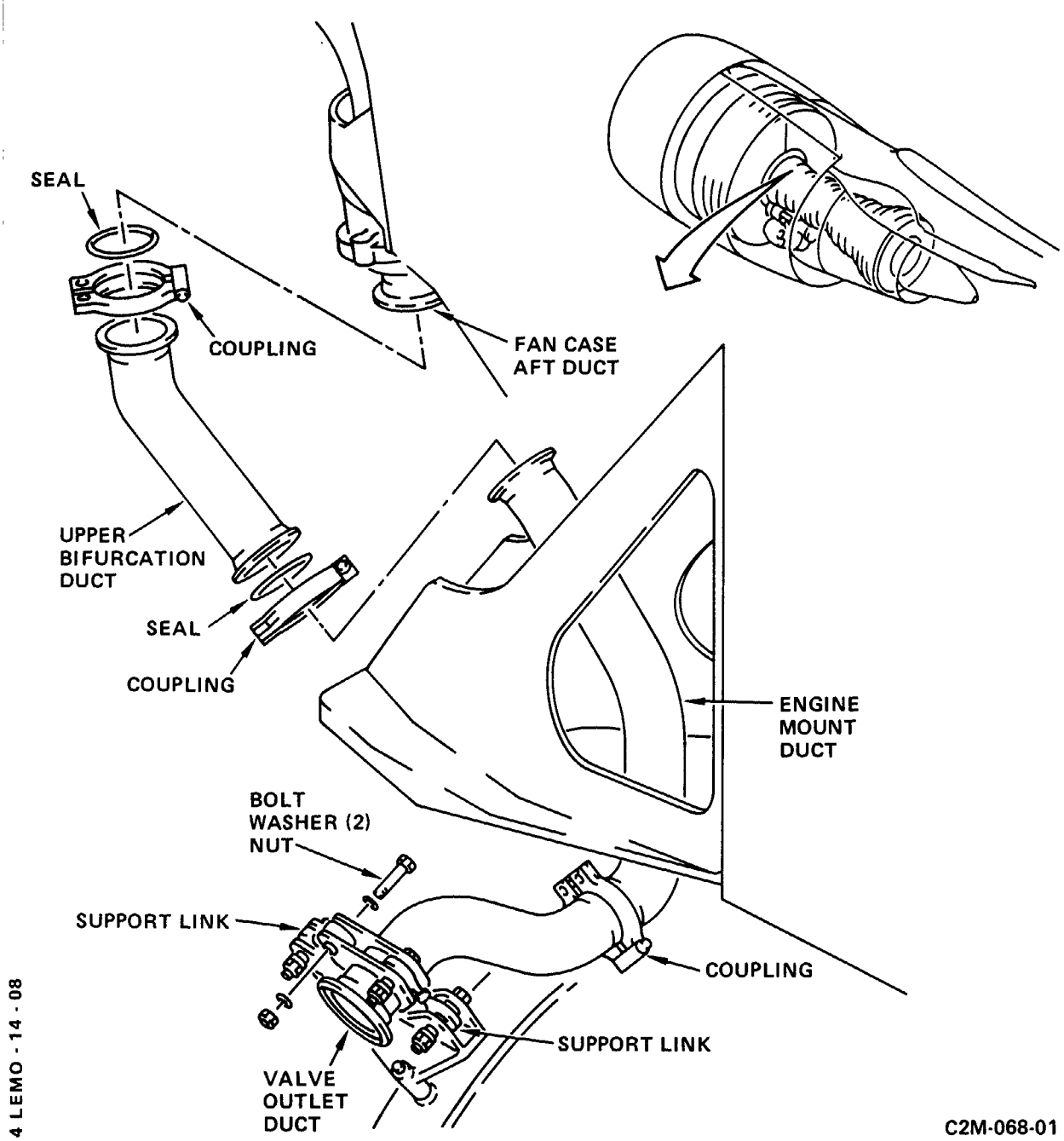
R (16)Release screws attaching aft mount access panels 475AL (485AL) and

R 476AR (486AR) panels to pylon fairings. Remove panels. (Ref. Fig. 420)



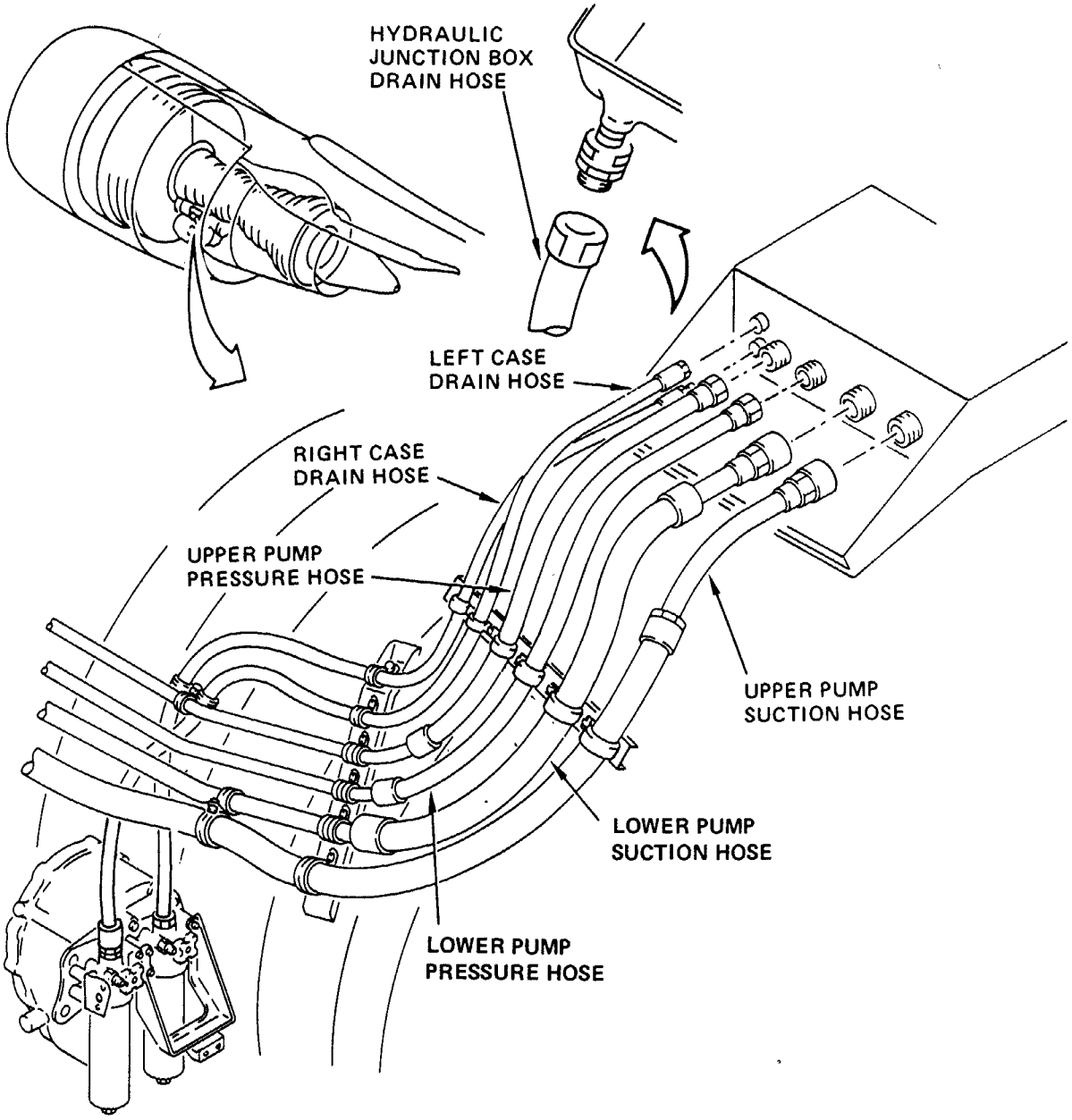
BM5 71 00 00 4 LCMO - 14 - 08
DM5

Fan Case Anti-Ice Ducts
Figure 409



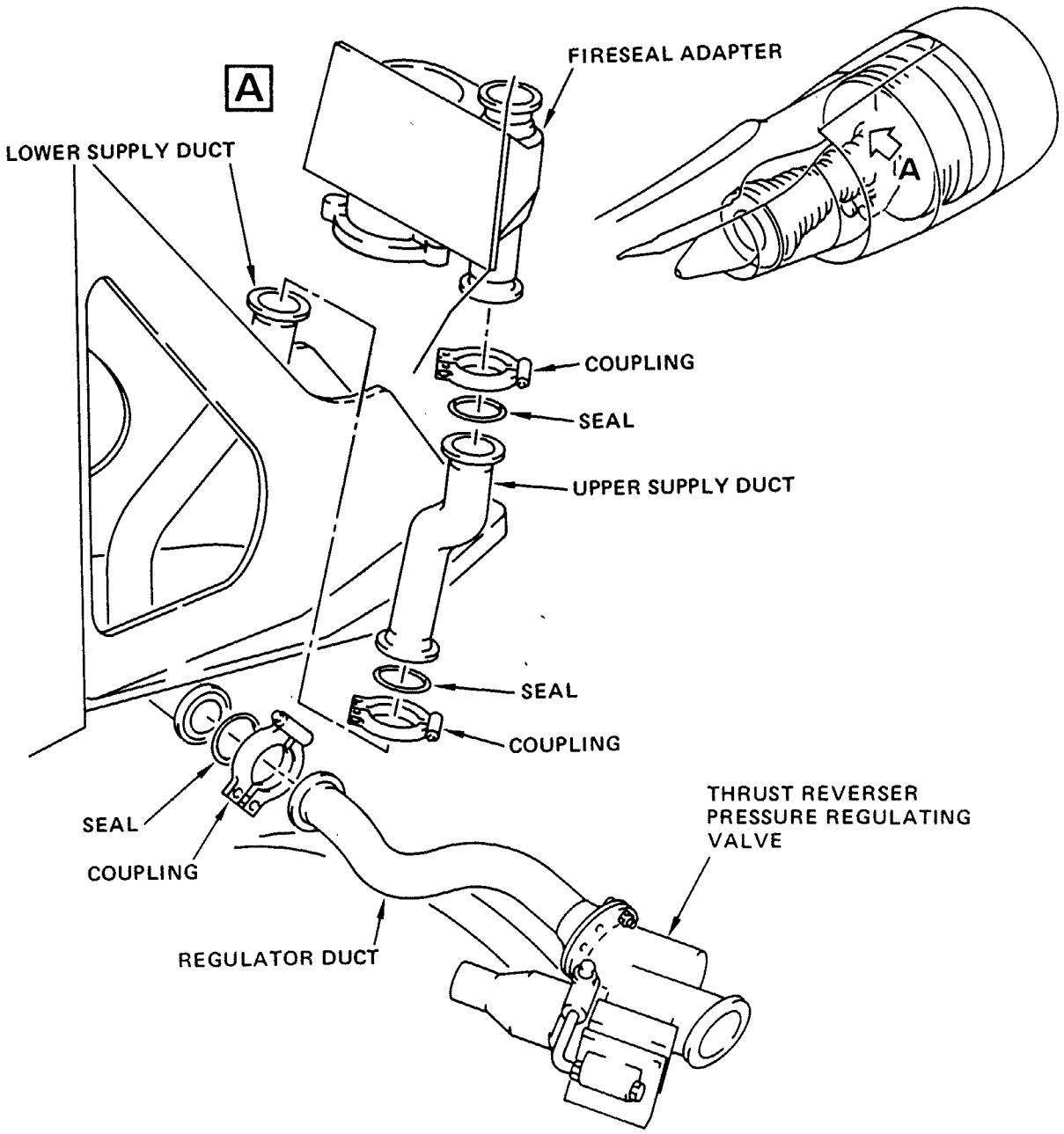
BM5 71 00 00 4 LEMO - 14 - 08
DM5

Engine Core Anit-Ice Ducts
Figure 410

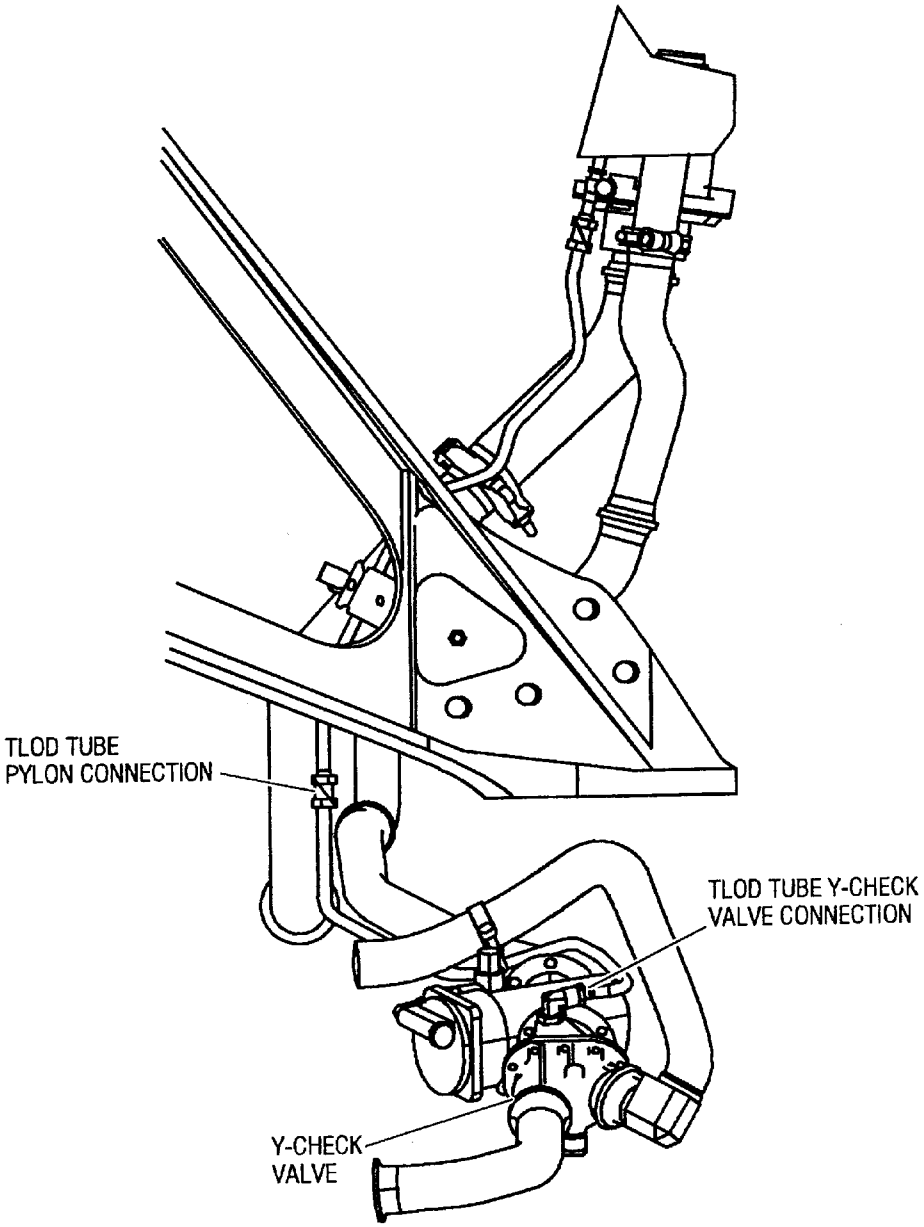


BM5 71 00 00 4 LGMO - 24 - 19
DM5

Hydraulic Hoses
Figure 411

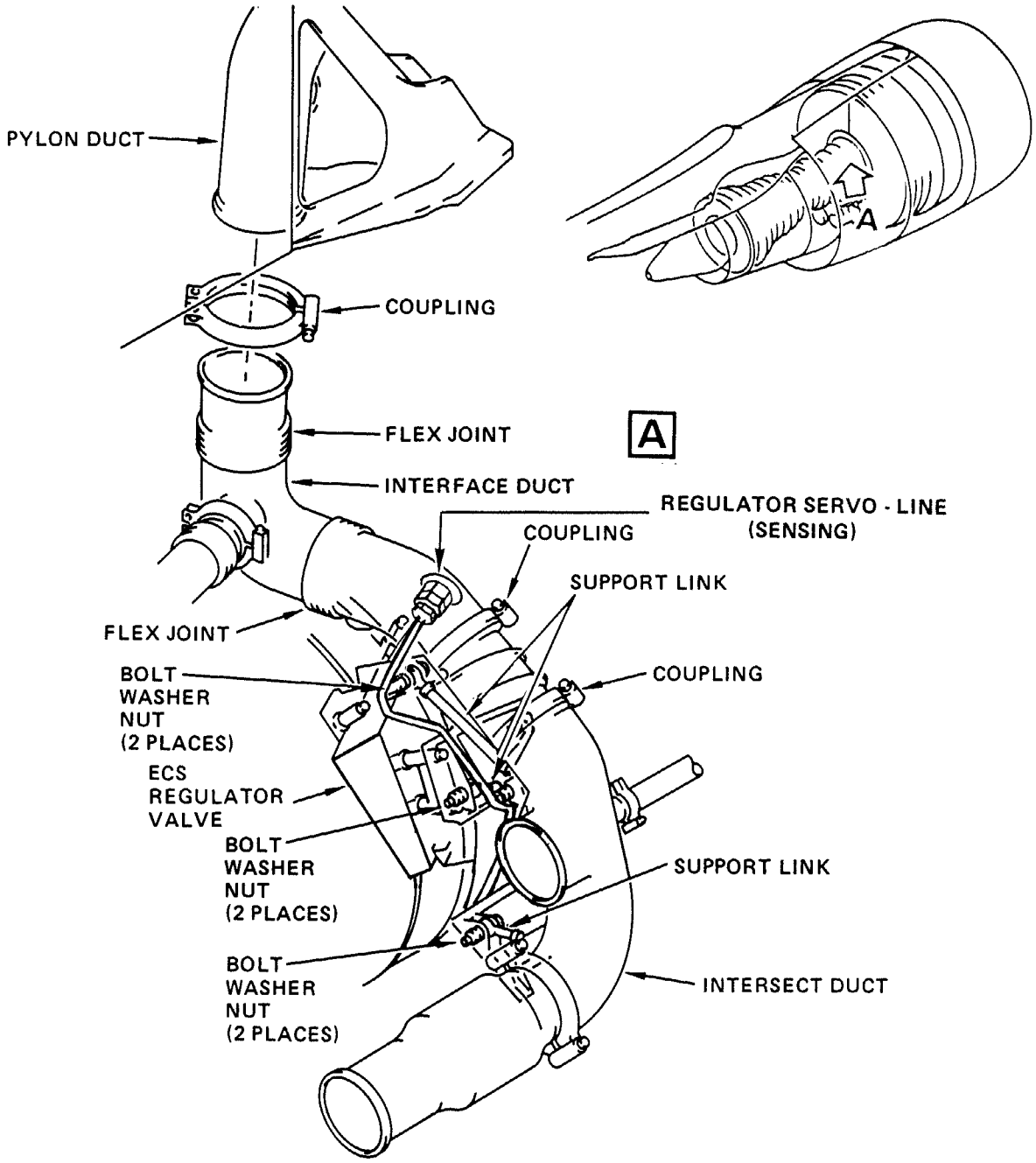


Thrust Reverser Ducts
Figure 412



BM5 71 00 00 4 LJQ0 00

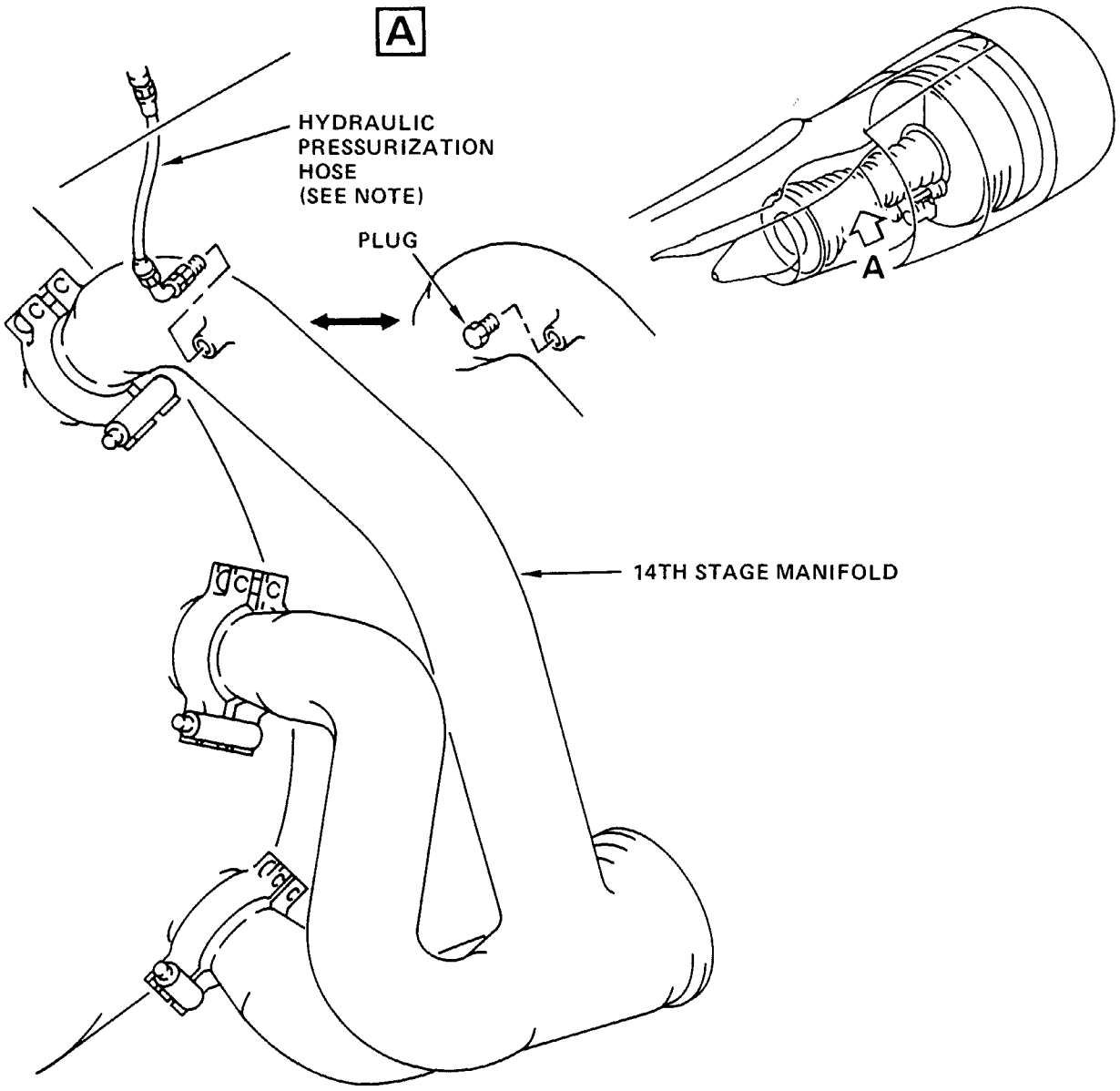
Thrust Reverser Ducts (Post SB TLOD)
Figure 413



BM5 71 00 00 4 LLMO - 27 - 22
DM5

C2M–071–02

Pneumatic Interface Duct
Figure 414

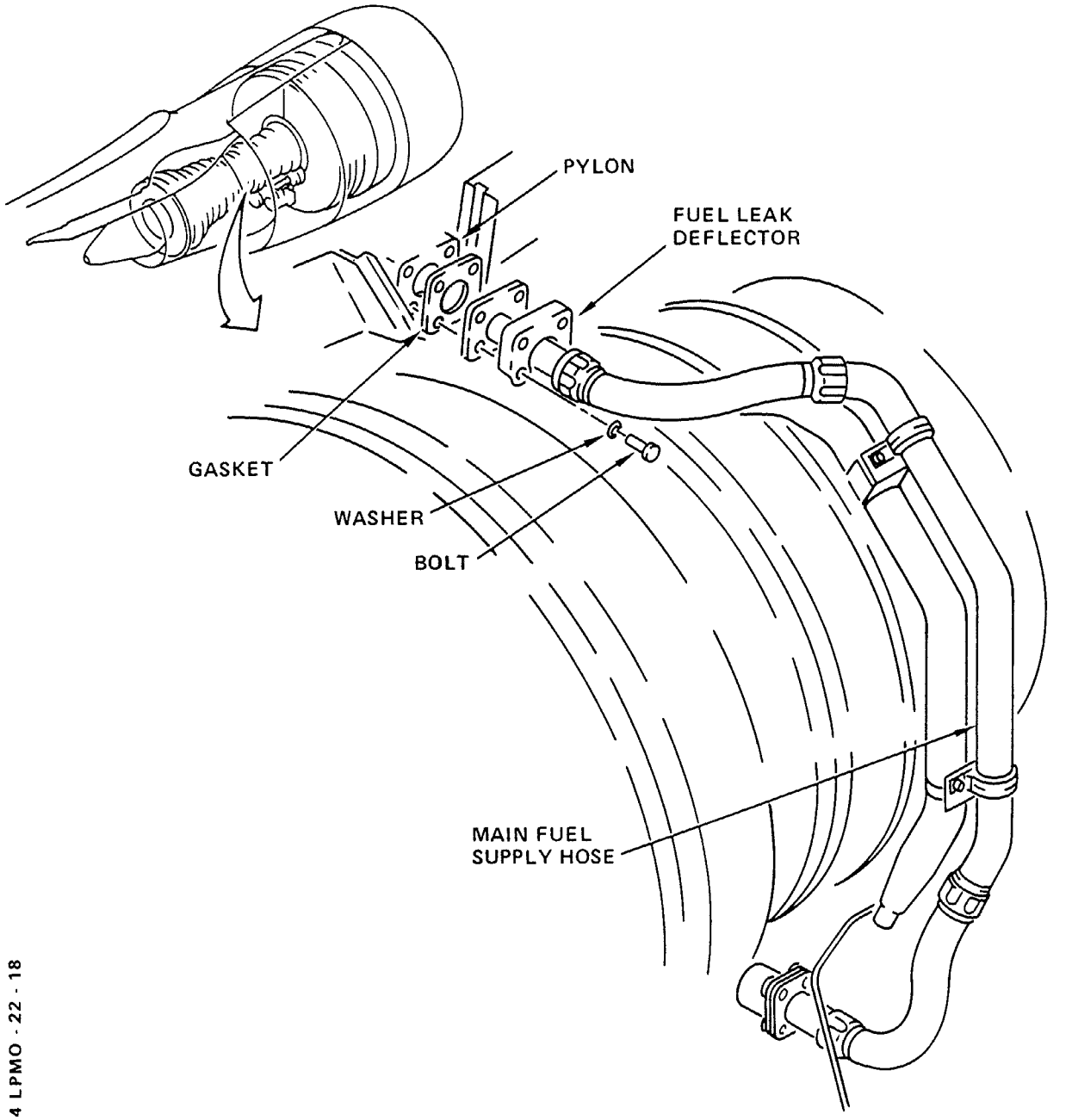


NOTE: ON NO. 1 ENGINE ONLY
PLUGGED ON NO. 2 ENGINE

C2M-072-01

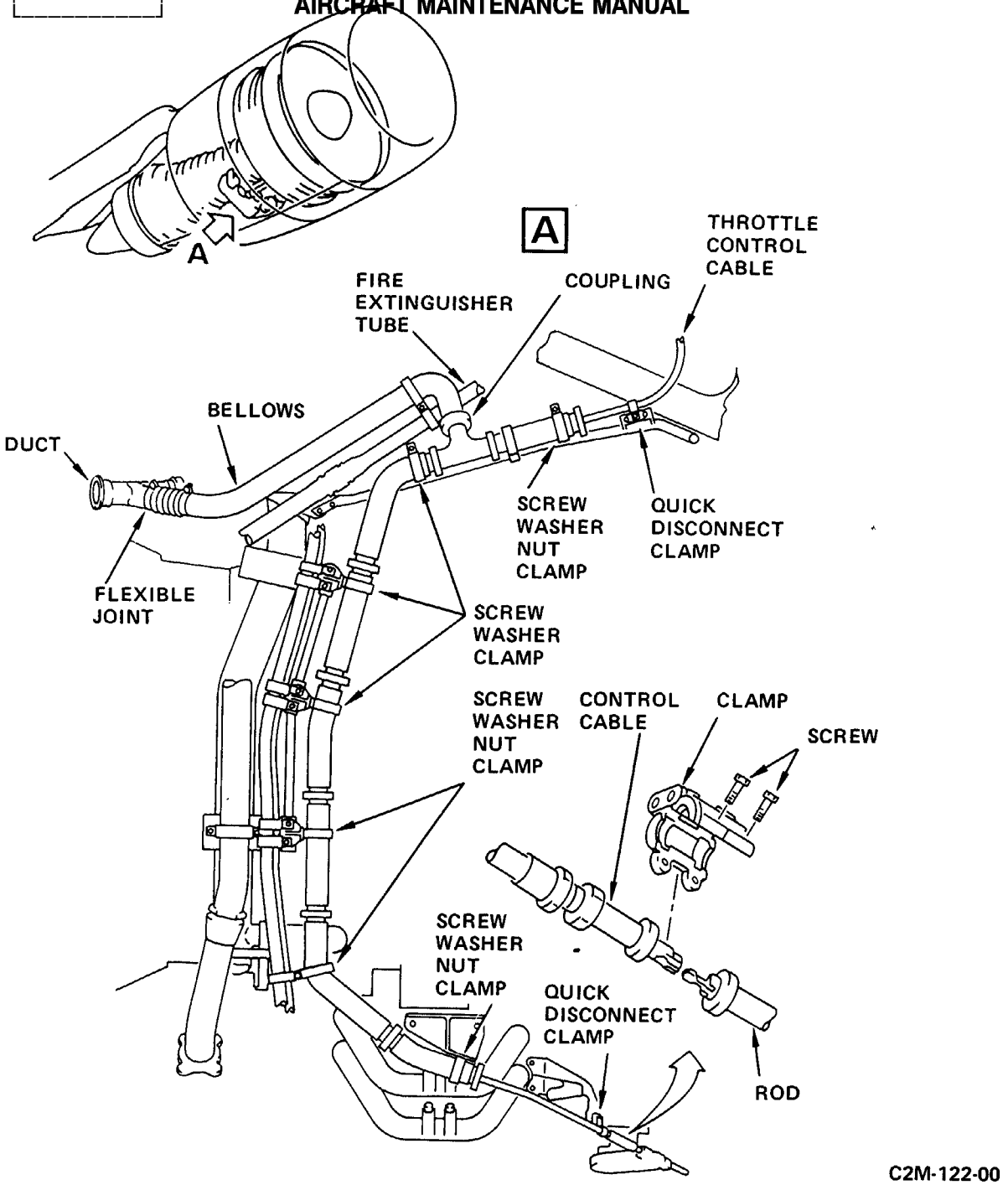
BM5 71 00 00 4 LNMO - 01

Hydraulic Pressurization Hose
Figure 415



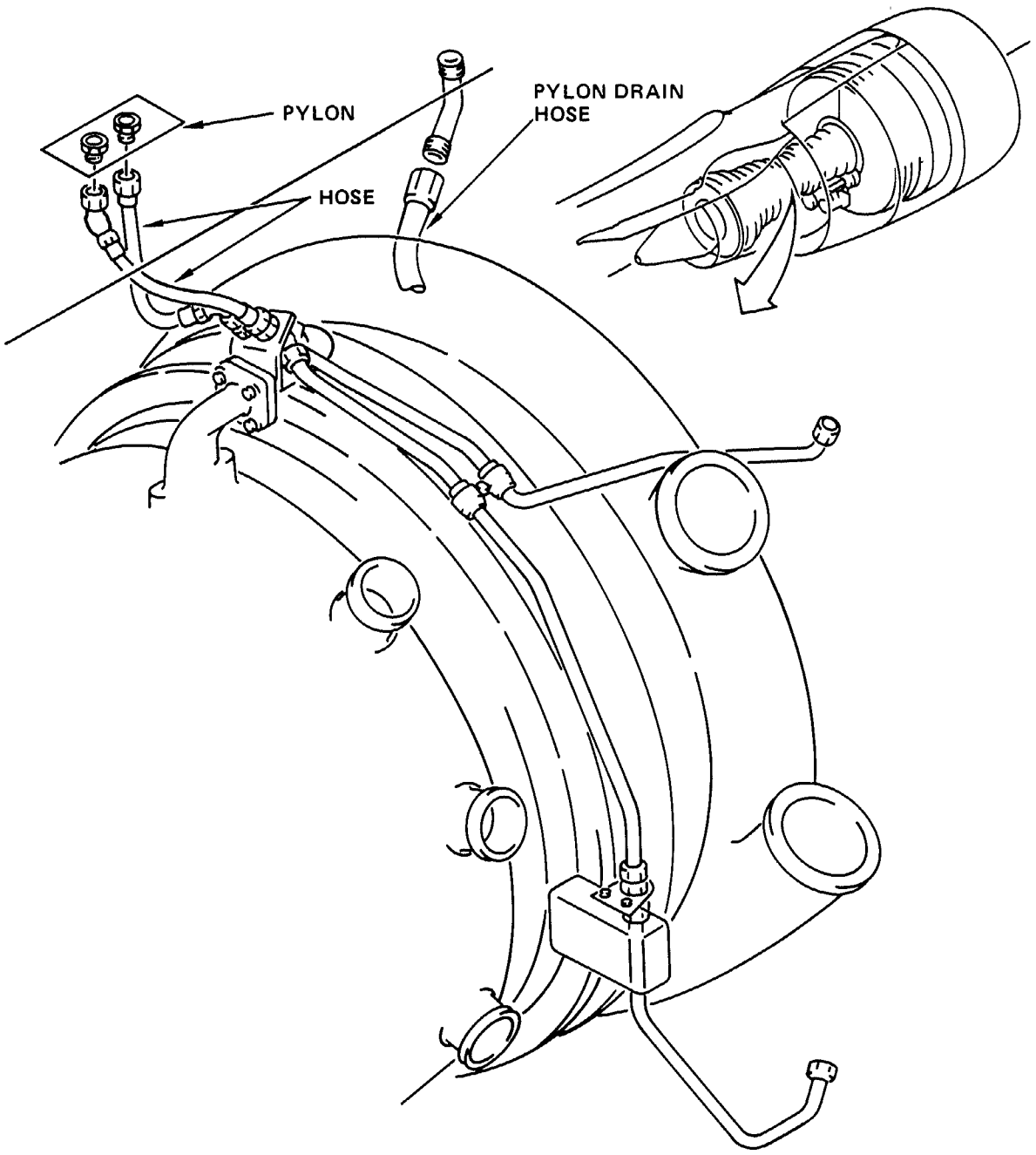
BM5 71 00 00 4 LPMO - 22 - 18
DM5

Main Fuel Supply Hose
Figure 416



BM5 71 00 00 4 LRLO - 01

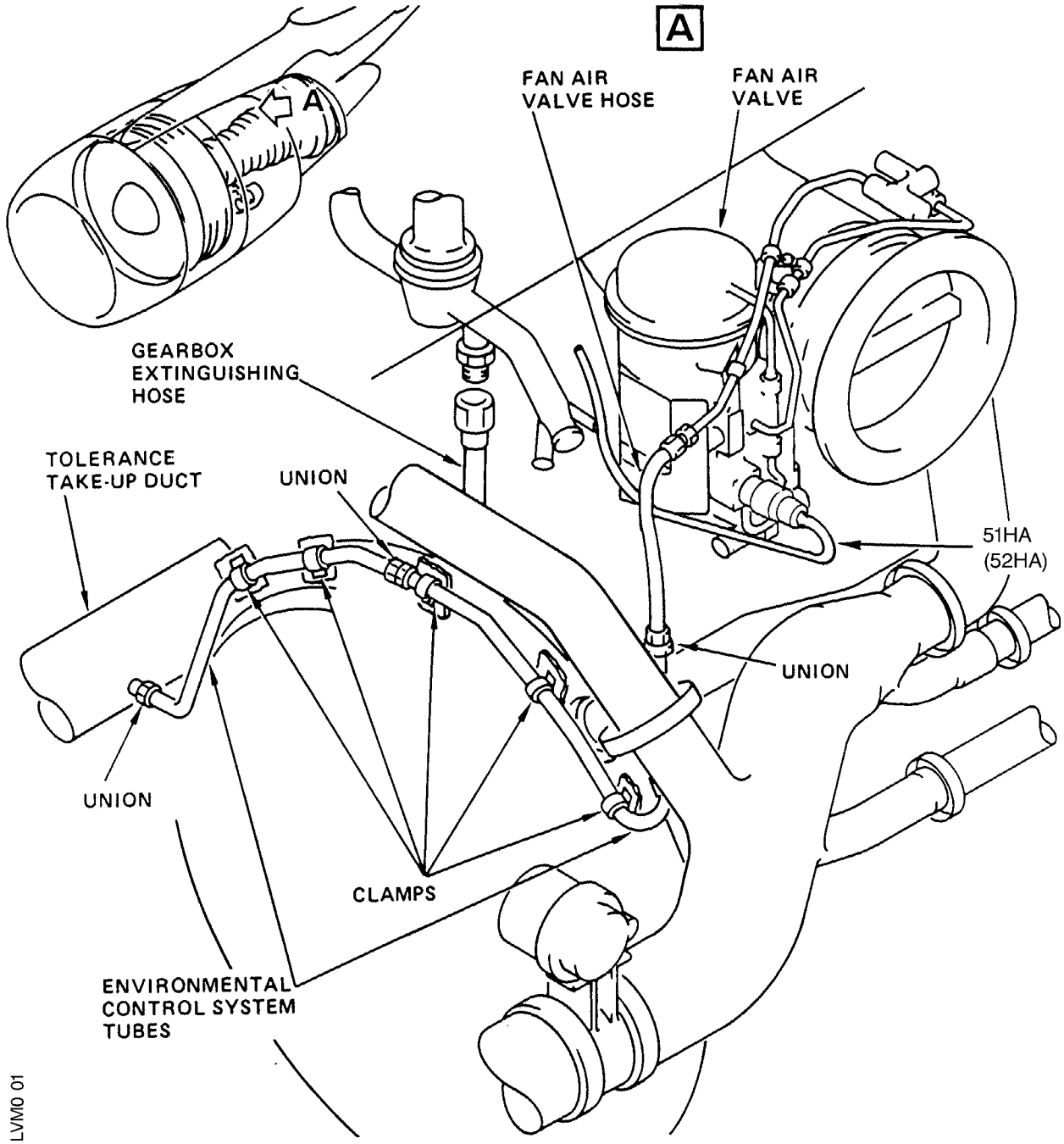
Throttle Control Cable
Figure 417



BM5 71 00 00 4 LTMO-18-14
DM5

C2M-075-01

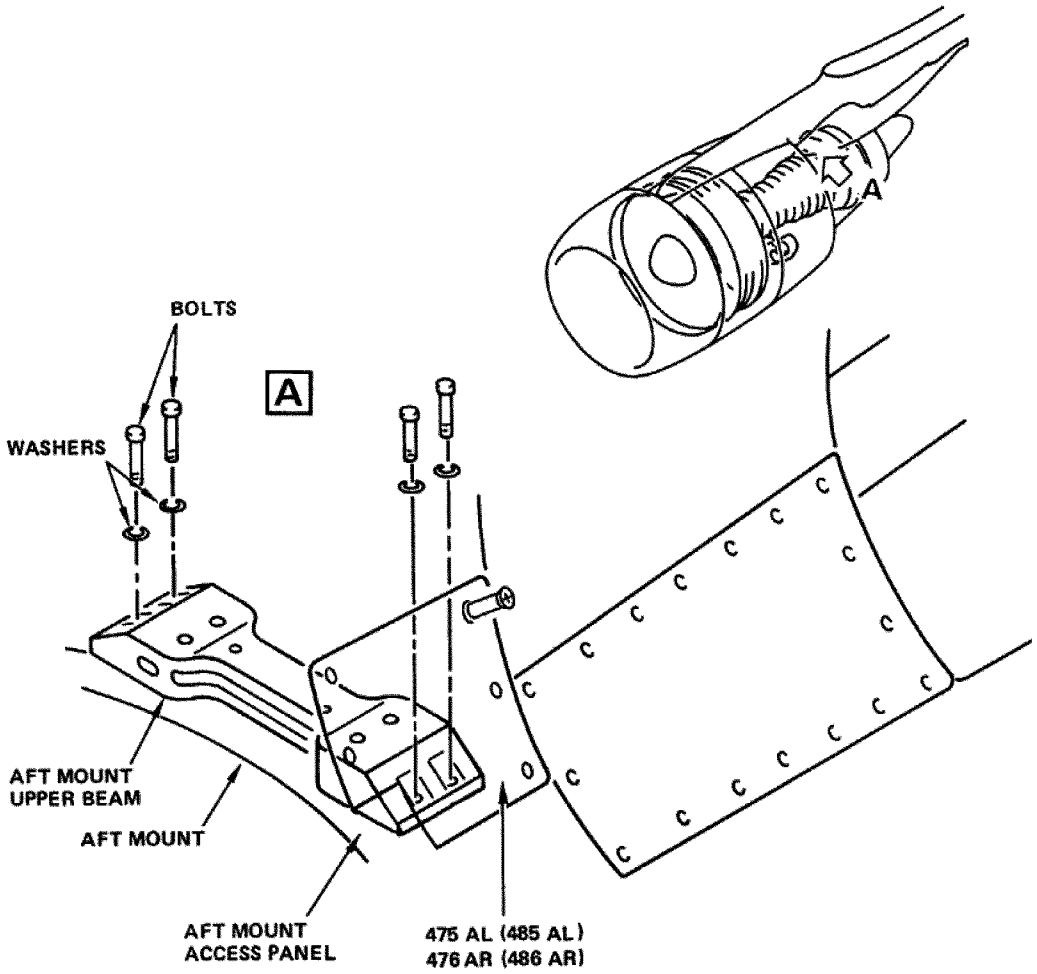
Pneumatic Sense Tubes
Figure 418



BM5 71 00 00 4 LVM0 01

C2M–066–01

Fan Air Valve Hose
Figure 419

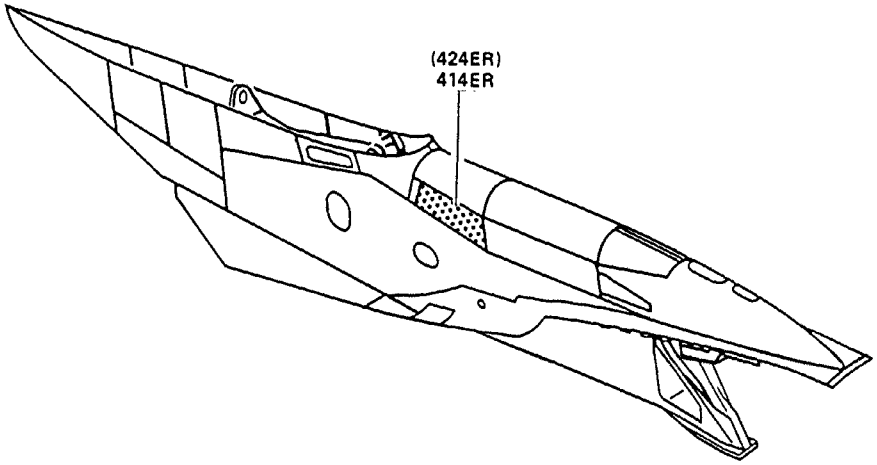


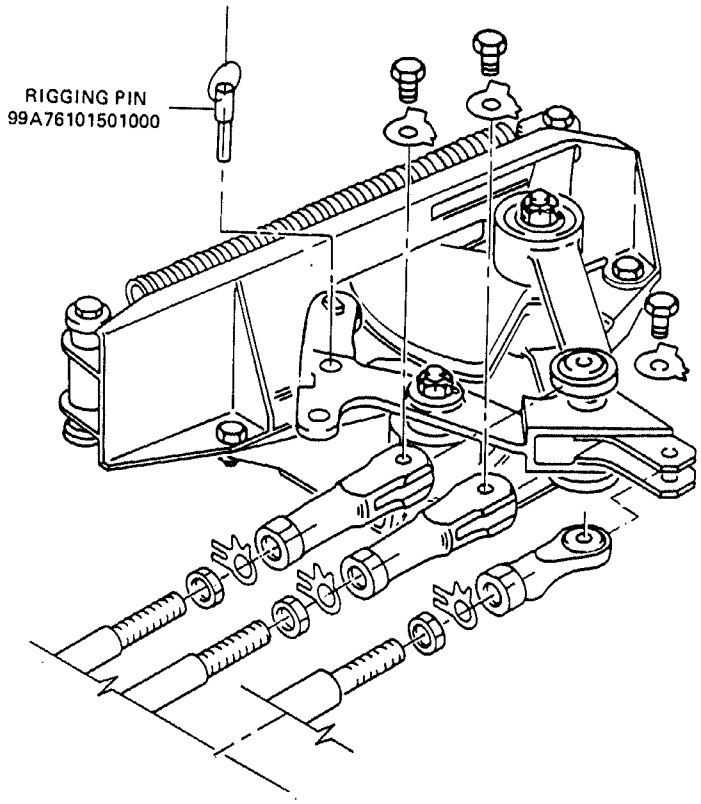
BM5 71 00 00 4 LXM0 01

C2M–078–00

R

Aft Mount Access Panels
Figure 420





BM5 71 00 00 4 LSMO - 27 - 22
DM5

Primary Relay Rigging
Figure 421

C. Removal of Engine by Means of Engine Bootstrap
(Ref. Fig. 422, 424, 425)
(Ref. Fig. 426)
WARNING : - MAKE SURE THAT DURING ENGINE LOWERING PROCEDURE THE STIRRUPS OF REAR BEAM CABLE DO NOT JAM IN THE PULLEYS.
FOR THIS PURPOSE MAKE CERTAIN THAT CABLE LENGTH IS EQUAL ON EITHER SIDE OF THE BOOTSTRAP.
- VALUES ON DYNAMOMETERS MUST BE CLOSELY MONITORED.
- IN CASE OF JAMMING OF THE STIRRUPS OF REAR BEAM CABLE IN THE PULLEYS, OVERLOADS CAN BE APPLIED ON THE PYLON AFT HOIST FITTINGS WITH A POSSIBLE FAILURE AT TOOLING ATTACHMENTS WHICH COULD LEAD TO THE ENGINE FALL WITH AS A POSSIBLE CONSEQUENCE SERIOUS INJURY TO PERSONNEL.
- IF OVERLOADS ARE APPLIED AS A PREVENTIVE MEASURE PYLON AFT HOIST FITTINGS AND BOLTS MUST BE SYSTEMATICALLY REPLACED.

(1)Untighten the six screws and remove pylon leading edge fairing (1).

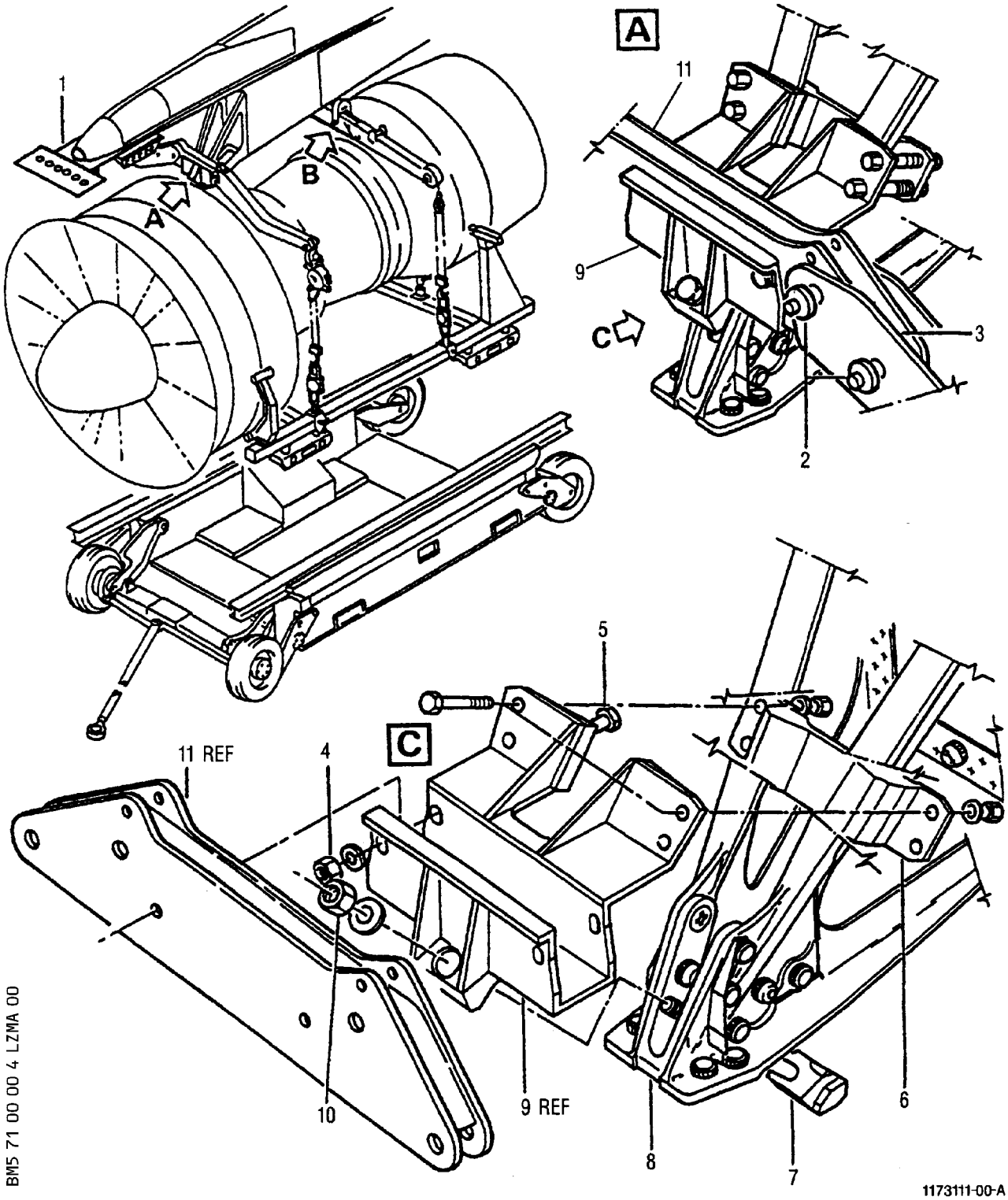
Post SB GE 75-122

(2)Remove LPT cooling air manifold segments at 11 and 1 o'clock as follows (Ref. Fig. 423).
(a)Remove three coupling V-band clamps (2) that connect the two LPT cooling air manifolds (1) between the 11 and 1 o'clock positions.
(b)Remove four nuts, washers and bolts at the 10, 11, 12 and 1 o'clock positions (Ref. Fig. 423) (Detail B).
(c)Loosen eight nuts, bolts, and manifold clips at the 10, 11, 12 and 1 o'clock positions (Ref. Fig. 423) (Detail C).
(d)Lift and remove the two LPT cooling air manifold segments (1) at 11 and 1 o'clock positions.

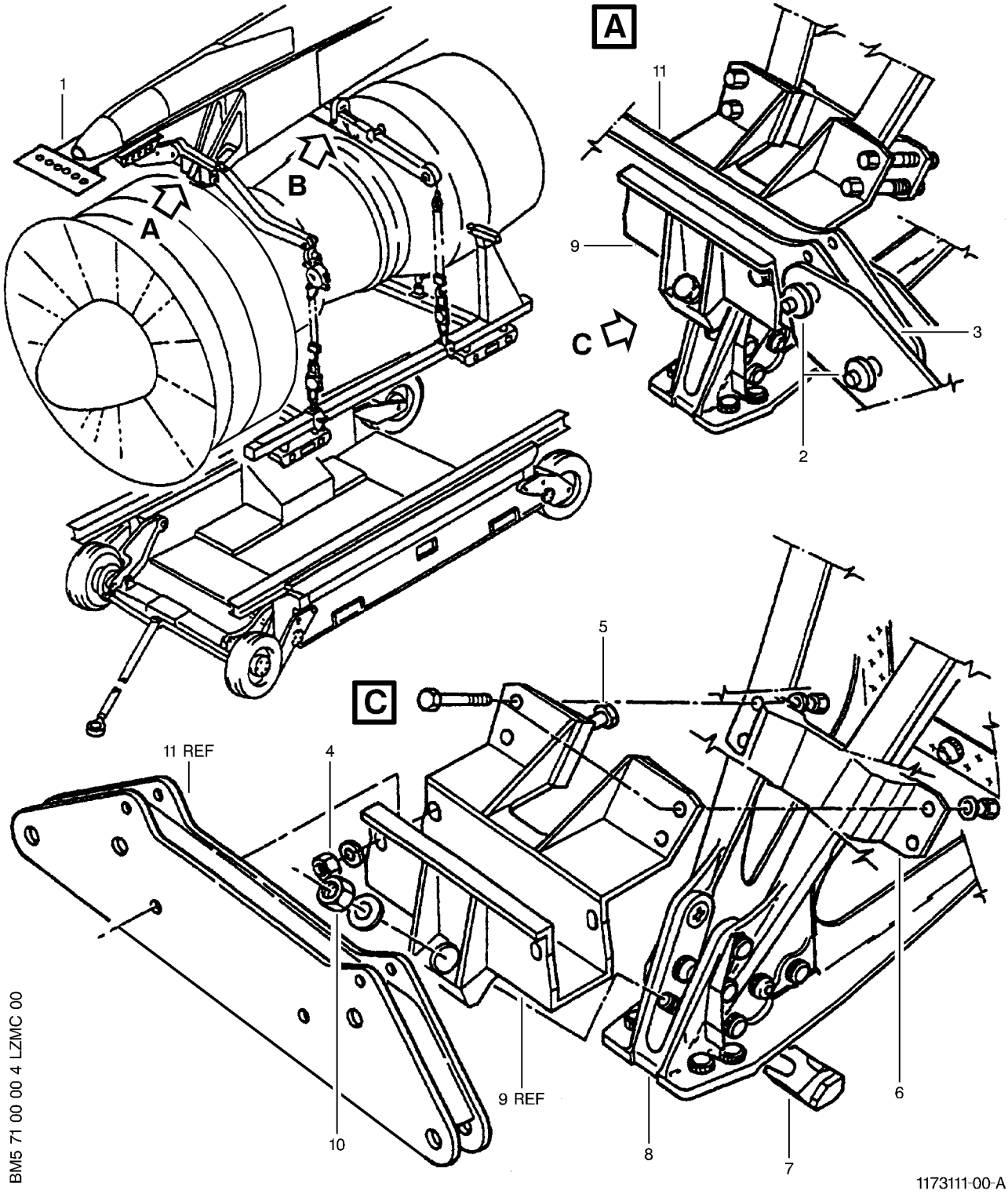
End Post SB GE 75-122

(3)Install engine hoisting bootstrap assemblies (U0787001) as follows : (Ref. Fig. 422) (Sheets 1/3 or 2/3).
(a)Install channel (9) and backing plate (6) on each side of forward attach fitting (8). Hand tighten the four nuts.
WARNING : MAKE CERTAIN THAT THE SHOE (7) IS POSITIONED CORRECTLY AS INCORRECT INSTALLATION WOULD RESULT IN AN UNSAFE BOOTSTRAP ASSY ATTACHMENT AND CAUSE PYLON STRUCTURE MEMBER DAMAGE.
(b)Install shoe (7).
(c)Install bolt and nut (10). Center assembly and tighten nut (10). TORQUE the four bolts to between 177 and 265 lbf.in (2.00 and 3.00 m.daN).
(d)Position forward bootstrap main section (11) in support channel (9), align main section holes with channel slots, and install with two bolts (5) and nuts (4).
(e)Assemble side arms (3) on forward bootstrap main section (9) using quick release pins (2)

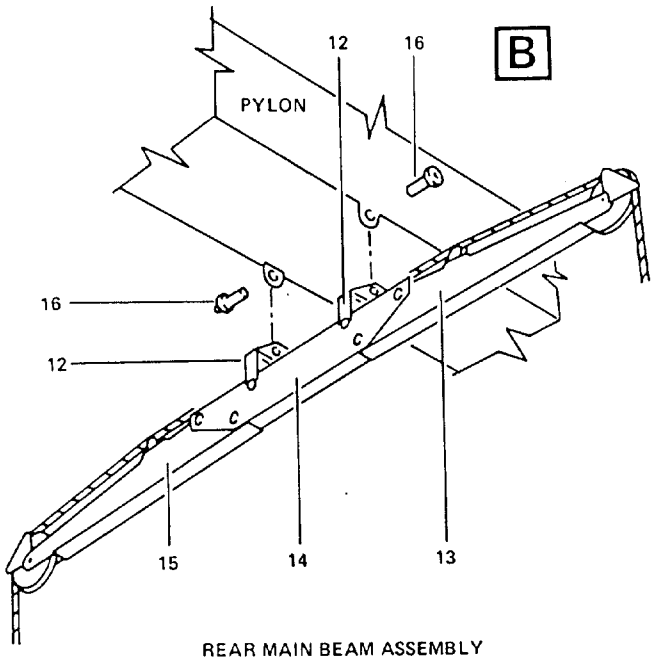
(4)Install rear main beam (Ref. Fig. 422) (Sheet 3/3).
(a)Attach shackles (12) to engine pylon with pins (16).
(b)Hang rear main beam (14) on with pins (16) using quick release pins.
(c)Assemble side arms (13) and (15) on main support beam using quick



Installation of the Engine Bootstrap with
SMIG277CR80 Cradle or S277CR80 Cradle (Sheet 1/3)
Figure 422



Installation of the Engine Bootstrap with TMHEC08-00-00 Cradle (Sheet 2/3)
Figure 422



REAR MAIN BEAM ASSEMBLY

Installation of the Engine Bootstrap (Sheet 3/3)
Figure 422

release pins.

(d)Place cable under shackles making certain that it rests on pulleys.

NOTE : Position cable so that swaged sections of cable do not interfere with pulleys.

(5)Install pulley blocks on front and rear main beams (Ref. Fig. 426).

(a)Taking approximately 2 meters (6 ft. 7 in.) of chain, place locking lever in the up position.

(6)Install the two forward dynamometers on lower hooks of front R and L pulley blocks, after having checked their operation and adjusted the alarm to 2350 daN (5282 lbf).

(7)Install the aft dynamometer on lower hook of rear L pulley block after having checked its operation and adjusted the alarm to 1100 daN (2472 lbf).

(8)Position engine storage and transportation trailer, complete with adapter cradle assembly, under engine.

NOTE : Check position of rollers on trolley, they must be locked in the "WING ENGINE" holes.

(9)Attach the three dynamometers and lower hook of the rear R pulley block to cradle hoist points. (Ref. Fig. 426).

(10)Release the cradle roller locks before removing pins.

(11)Free pins attaching adapter cradle to trailer and raise cradle assembly to the engine.

NOTE : Level adapter cradle using pulley blocks if necessary.

(12)Install front fixtures (2) of adapter cradle (SMIG277CR80 or S277CR80) on the engine (Ref. Fig. 424) or install front fixture of adapter cradle (TMHEC08-00-00) on the engine (Ref. Fig. 425).

(13)Unlock rear fixtures (3), push them back into their housings to prevent them interfering with the engine.

(14)Continue raising adapter cradle, proceeding to engage front fixtures in their housings on adapter cradle. At the same time check alignment of L and R rear fixtures and lower yoke (4), and appropriate bolt thru lower yoke (4).

(15)After having inserted pins in each fixture, proceed to simultaneously tension pulley blocks so that 2350 daN (5282 lbf.) is indicated on front dynamometers, and 1100 daN (2472 lbf.) indicated on rear dynamometer.

(16)Unsafety and unscrew engine mount attachment bolts (1) and (3) approx. 1cm (0.4 in.). (Ref. Fig. 427)

(17)Remove mount bolts (3), washers (4), nuts (5) and retainer assemblies (6) attaching forward mount to pylon beam (Ref. Fig. 427).

(18)Remove lockwire, mount bolts (1) and washers (2) attaching aft mount to pylon beam (Ref. Fig. 427).

(19)Place pulley block locking levers in the down position.

(20)Lower engine/adapter cradle with the four pulley blocks checking that assembly is level, until nearly completely down.

WARNING : - MAKE SURE THAT DURING ENGINE LOWERING PROCEDURE THE STIRRUPS OF REAR BEAM CABLE DO NOT JAM IN THE PULLEYS.
FOR THIS PURPOSE MAKE CERTAIN THAT CABLE LENGTH IS EQUAL ON EITHER SIDE OF THE BOOTSTRAP.
- VALUES ON DYNAMOMETERS MUST BE CLOSELY MONITORED.
- IN CASE OF JAMMING OF THE STIRRUPS OF REAR BEAM CABLE IN THE

PULLEYS, OVERLOADS CAN BE APPLIED ON THE PYLON AFT HOIST FITTINGS WITH A POSSIBLE FAILURE AT TOOLING ATTACHMENTS WHICH COULD LEAD TO THE ENGINE FALL WITH AS A POSSIBLE CONSEQUENCE SERIOUS INJURY TO PERSONNEL.

- IF OVERLOADS ARE APPLIED AS A PREVENTIVE MEASURE PYLON AFT HOIST FITTINGS AND BOLTS MUST BE SYSTEMATICALLY REPLACED.

(Ref. Fig. 426)

(21)Position first the aft section of engine/adapter cradle assembly on trolley, then the forward section.

(22)Lock adapter cradle to trailer using quick release pins.

(23)Lock rollers to trailer chassis.

(24)Lower the four pulley blocks to release cable tension and remove the four hooks from cradle hoist points.

(25)Remove the engine.

NOTE : Install engine on the adapter cradle on trailer SMIG 277ETT.

Post SB GE 75-122

(26)Install LPT cooling air manifold segments at 11 and 1 o'clock as follows (Ref. Fig. 423) :

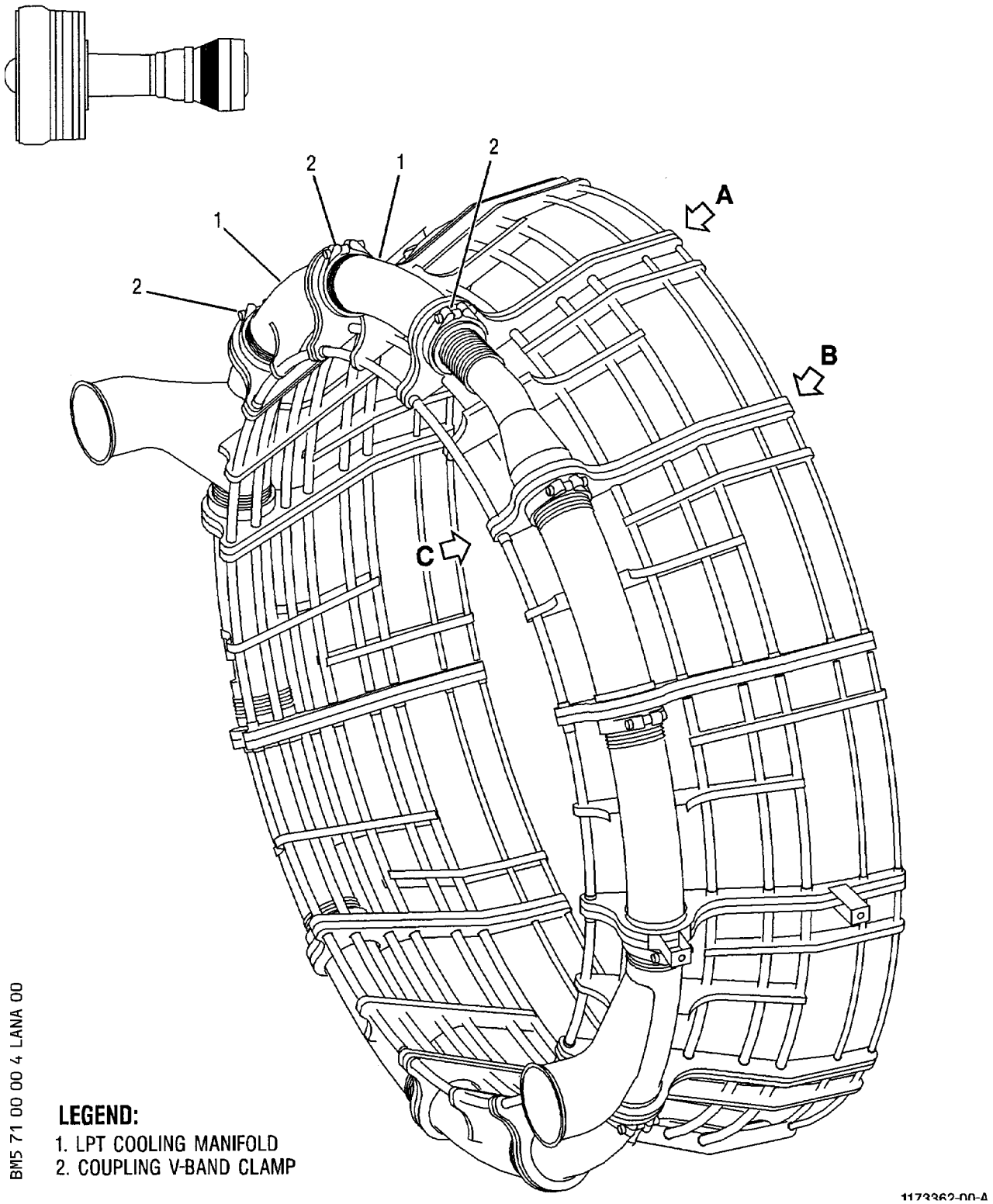
(a)Install the two LPT cooling air manifold segments (1) in the 11 and 1 o'clock positions.

(b)TORQUE the eight nuts at the 10, 11, 12 and 1 o'clock positions to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN) (Ref. Fig. 423) (Detail C).

(c)Install four bolts, washers, and nuts at the 10, 11, 12 and 1 o'clock positions. TORQUE the nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN) (Ref. Fig. 423) (Detail B).

(d)TORQUE the coupling V-band clamps (2) to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN) (Ref. Fig. 423) (Detail C).

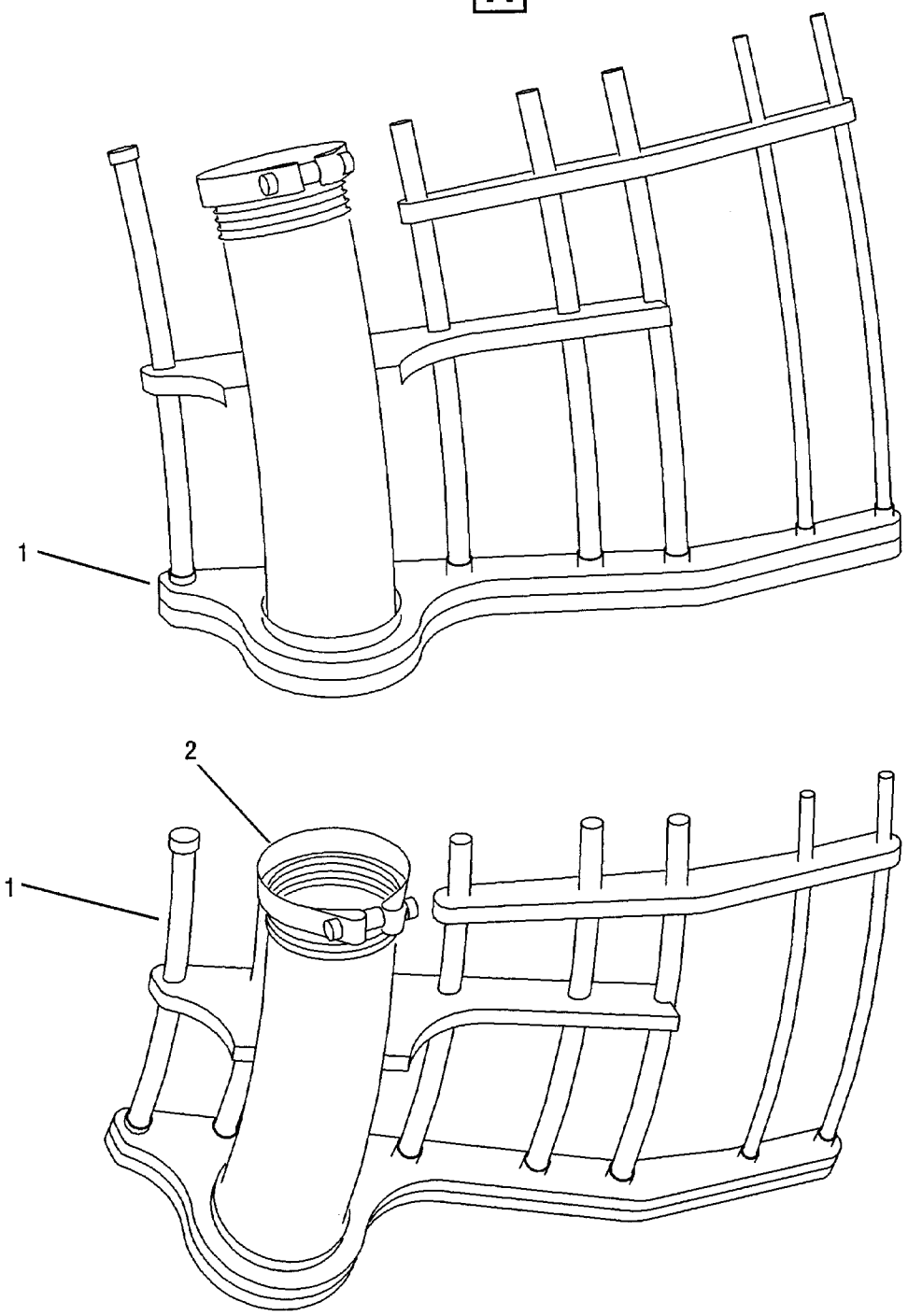
End Post SB GE 75-122



BM5 71 00 00 4 LANA 00

LEGEND:
1. LPT COOLING MANIFOLD
2. COUPLING V-BAND CLAMP

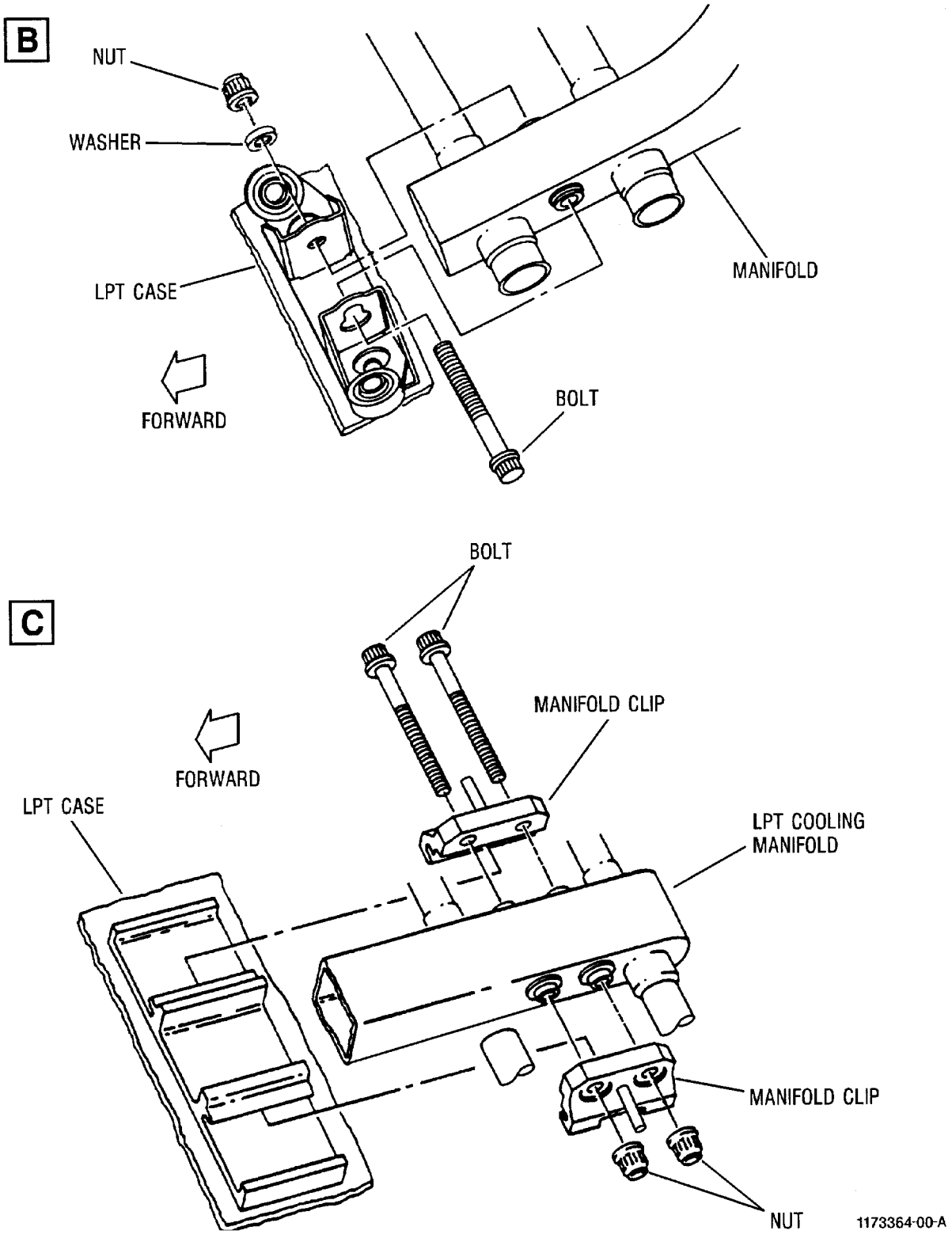
Removal/Installation of Two LPT Cooling Air Manifold Sections (Post SB GE 75-122) (Sheet 1/3)
Figure 423



BM5 71 00 00 4 LANB 00

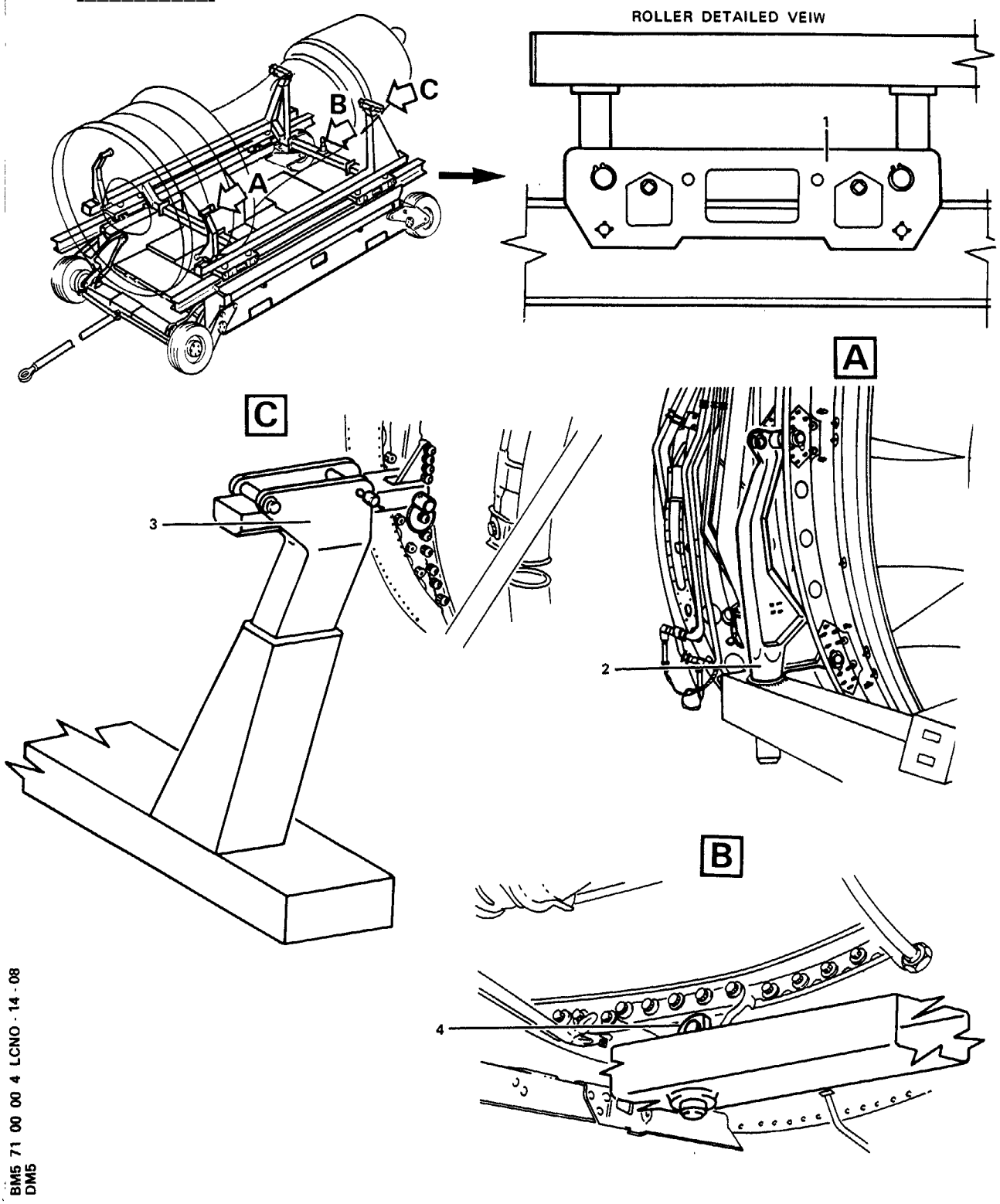
1173363-00-A

Removal/Installation of Two LPT Cooling Air Manifold Sections (Post SB GE 75-122) (Sheet 2/3)
Figure 423

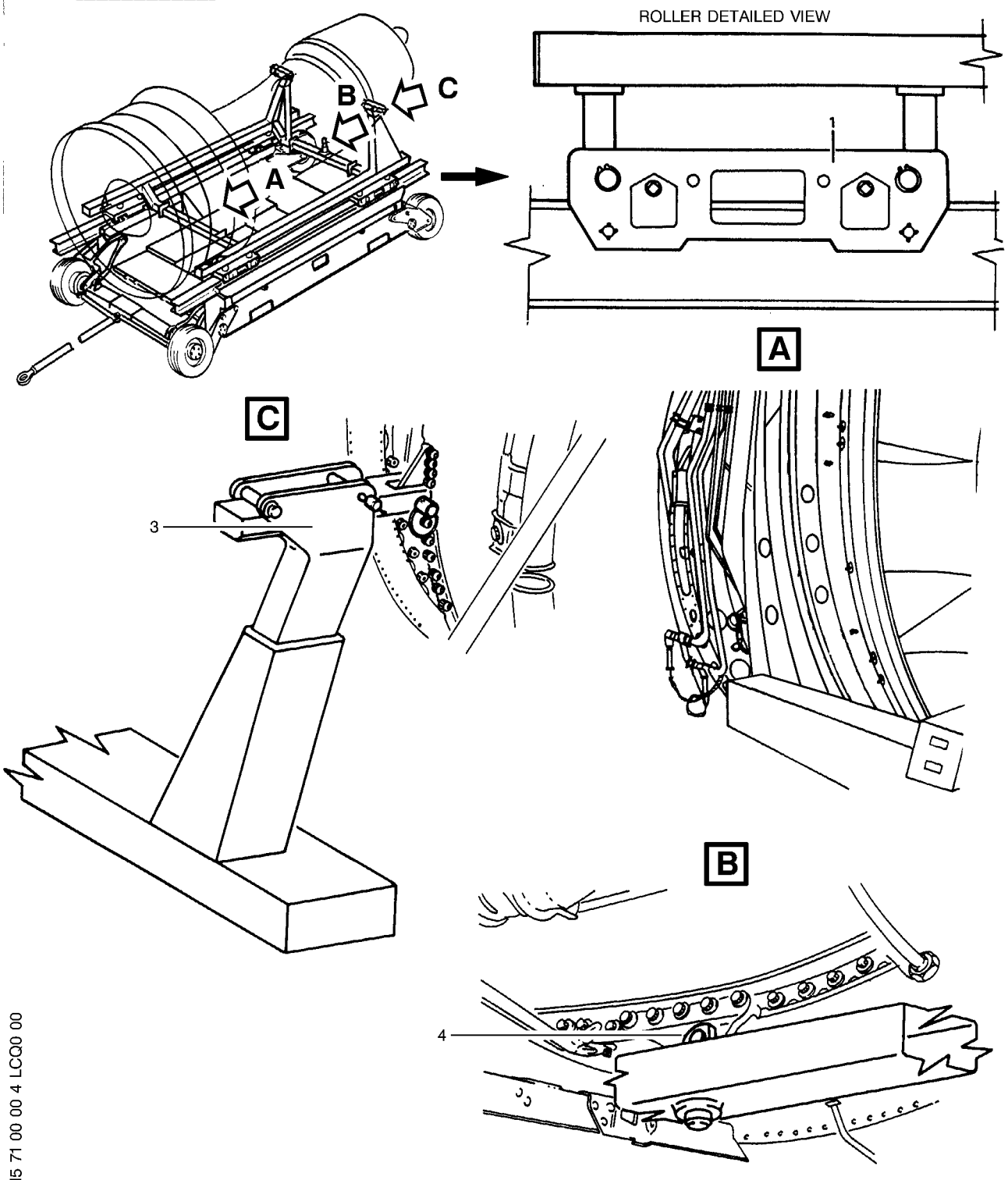


BM5 71 00 00 4 LANC 00

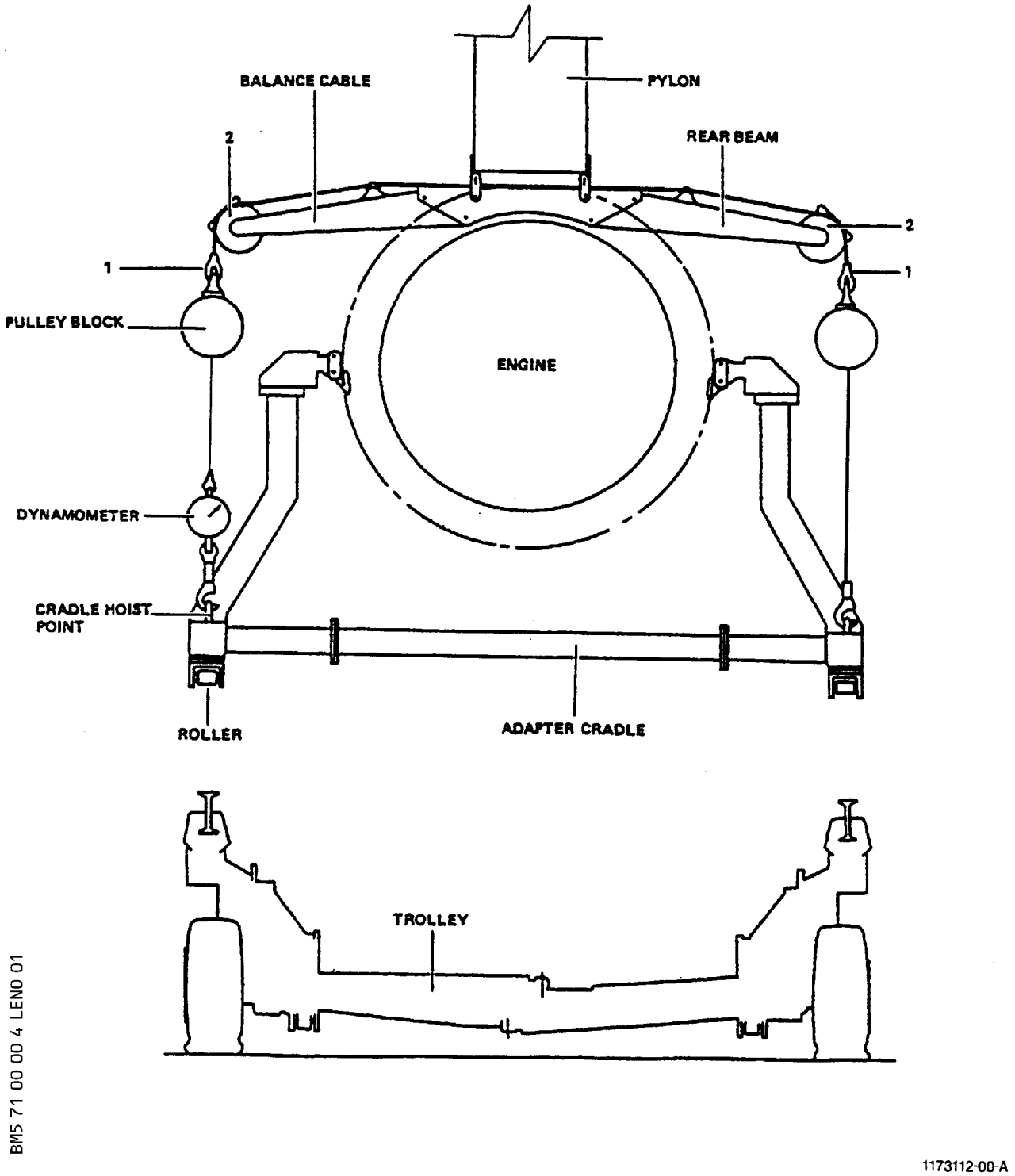
Removal/Installation of Two LPT Cooling Air Manifold Sections (Post SB GE 75-122) (Sheet 3/3)
Figure 423



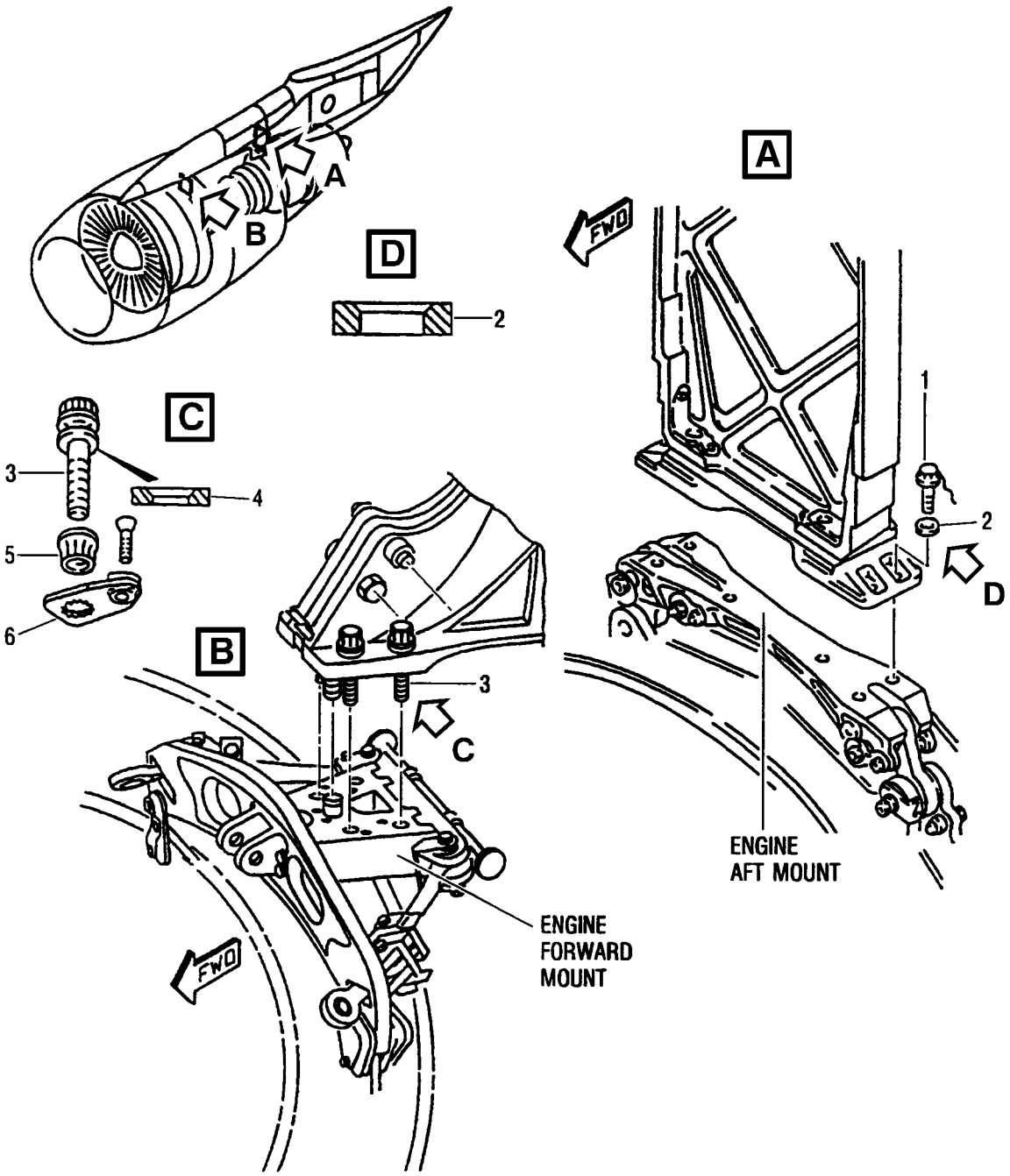
Adapter Cradle (SMIG277CR80 or S277CR80) -
Attachment Points to Engine
Figure 424



Adapter Cradle (TMHEC08-00-00) -
Attachment Points to Engine
Figure 425



Hoisting of Engine/Cradle Assembly Aft Section
Figure 426



BM5 71 00 00 4 LGN0 02

Engine Mounts and Attach Points
Figure 427

D. Removal of Engine by Means of Hydraulic Positioner
(Ref. Fig. 424, 428)

WARNING : DURING LIFTING AND LOWERING BRAKES SHALL NOT BE APPLIED TO HYDRAULIC POSITIONER WHEELS.

WHEN TRAILING EMPTY POSITIONER ALWAYS KEEP IT AS LOW AS POSSIBLE AND DRIVE AT VERY SLOW SPEED, ESPECIALLY ON BAD ROADS.

NEVER FORGET TO REMOVE RATCHETS FROM RATCHET WHEEL.

GENEROUSLY APPLY GRAPHITE GREASE TO SUPPORTING PADS OF RAILS.

ALWAYS OBSERVE THAT FRONT AND REAR BRACKETS DISENGAGE FROM ADAPTER, WHEN LOWERING POSITIONER OTHERWISE THERE IS A GREAT RISK OF RETAINING RAILS AND BENDING ADJUSTMENT SCREWS.

ALWAYS REMOVE FOUR LOCATING SCREWS BEFORE ADJUSTING RAILS CENTER LINE WITH TWO SIDE ADJUSTING SCREWS. ALWAYS INSTALL THESE FOUR SCREWS BEFORE TRAILING POSITIONER.

WHEN LOWERING POSITIONER ALWAYS MAKE CERTAIN THAT THE FOUR RATCHETS HAVE BEEN RELEASED, IF NOT STOP MOVEMENT IMMEDIATELY. PUMP UP AGAIN, LIBERATE RATCHETS, AND LOWER AGAIN.

(1)Procedure with positioner to engine preloading (recommended procedure).

NOTE : Hydraulic positioner must be equipped with load measurement device which can give the load repartition (forward and aft position), and warning to prevent the overloads.

(a)With a plumb line and a piece of chalk project center line of engine and mark position on ground.

(b)Remove front and rear engine attachment fixture (2) and (3) lower yoke (4) (Ref. Fig. 424) from cradle and install on engine. Apply grease generously to mating cradle parts.

(c)At each cradle roller of adaptor loosen the two clamps and shake them to make certain that they are clear of the rail.

(d)Remove the eight lock pins from rollers and retain.

(e)Check indicators for correct operation. On both indicators, read value F shown.
Set warning value as follows :
- Forward indicator : F + 300 daN (675 lbf.)
- Aft indicator : F + 200 daN (450 lbf.).

(f)With tow bar on the exhaust side, make a long approach and push trailer under engine. One man shall guide the operation and watch for center line alignment. Stop positioner when all four brackets align with their corresponding locations on adaptor.

(g)Release the cradle from positioner frame by removing the four locating bolts from the roller support pads.

(h)Raise front and rear wheel assemblies of positioner simultaneously. One man at each pump, one man at each attachment fixture watching for correct engagement in cradle housings.
Stop lifting when attachment fixture are nearly engaged.

R (j)Push cradle forward or aft to obtain the best possible alignment.

Correct misalignment with the two adjustment screws.
CAUTION : USE POSITIONER WITH EXTREME CARE WHEN RAISING TO FINAL POSITION OR DAMAGE TO MOUNTS AND PYLON COULD RESULT.

R (k)When alignment of positioner center line and engine center line is considered to be satisfactory continue raising as evenly as possible until the two rear attachment fixtures engage in their housings. (If necessary tap with hide mallet). Make certain that the two front attachment fixtures engage their housing on adapter cradle.

R (l)Monitor the load indicators and raise the positioner with extreme care until the warning values are reached.

R (m)Unsafety and loosen forward and rear mount bolts until positioner is supporting the full engine weight. (Ref. Fig. 427) (1) and (3).

R (n)Remove mount bolts (3), washers (4), nuts (5) and retainer assemblies (6) attaching forward mount to pylon beam (Ref. Fig. 427).

R (p)Remove lockwire, mount bolts (1) and washers (2) attaching aft mount to pylon beam (Ref. Fig. 427).

R (q)Unlock front and rear hydraulic jack ratchets.
WARNING : BEFORE LOWERING PUMP ONE OR TWO STROKES UP BEFORE UNLOCKING AND RELEASING OIL RETURNS.

R (r)Open the two return valves of the two front and two rear jacks gradually and simultaneously. Keep engine center line horizontal during operation.
One observer on each side shall watch that engine is coming down without any interference.

R (s)Realign the rails with adjusting screws and install the four locating bolts.

R (t)Align rollers with corresponding points on rails, install the eight ball lock pins and tighten the eight securing clamps.

R (u)With engine clear of engine pylon, positioner may be pushed away with one man at each wheel and one man at tow bar.
Trailer shall be pushed towards wing leading edge.
Install engine on adapter cradle on trailer SMIG 277ETT (2).

(2)Procedure with gap between positioner and engine (Alternate procedure)

(a)With a plumb line and a piece of chalk project center line of engine and mark position on ground.

(b)Remove front and rear engine attachment fixture (2) and (3) lower yoke (4) (Ref. Fig. 424) from cradle and install on engine. Apply grease generously to mating cradle parts.

(c)At each cradle roller of adaptor loosen the two clamps and shake them to make certain that they are clear of the rail.
Remove the eight lock pins from rollers and retain.

(d)Raise positioner about 1.5 m (4.92 ft.) above ground.

(e)With tow bar on the exhaust side, make a long approach and push trailer under engine. One man shall guide the operation and watch for center line alignment. Stop positioner when all four brackets align with their corresponding locations on adaptor.

(f)Release the cradle from positioner frame by removing the four locating bolts from the roller support pads.

(g)Raise front and rear wheel assys of positioner simultaneously. One man at each pump, one man at each attachment fixture watching for correct engagement in cradle housings.

Stop lifting when attachment fixture are nearly engaged.

(h)Push cradle forward or aft to obtain the best possible alignment. Correct misalignment with the two adjustment screws.

CAUTION : USE POSITIONER WITH EXTREME CARE WHEN RAISING TO FINAL POSITION OR DAMAGE TO MOUNTS AND PYLON COULD RESULT. NEVER OPERATE POSITIONER TO COMPLETELY CLOSE GAP BETWEEN ATTACHMENT FIXTURES AND CRADLE HOUSINGS.

R (j)When alignment of positioner center line and engine center line is considered to be satisfactory continue raising as evenly as possible until the two rear attachment fixtures engage in their housings. (If necessary tap with hide mallet). Make certain that the two front attachment fixtures engage their housing on adapter cradle.

R (k)Stop raising positioner after four attachment fixtures are fully engaged in adapter and a gap of approx. 6 mm (1/4 in.) exists between cradle fixtures and cradle housings.

R (l)Unsafety and loosen forward and rear mount bolts until positioner is supporting the full engine weight. (Ref. Fig. 427) (1) and (3).

R (m)Remove mount bolts (3), washers (4), nuts (5) and retainer assemblies (6) attaching forward mount to pylon beam (Ref. Fig. 427).

R (n)Remove lockwire, mount bolts (1) and washers (2) attaching aft mount to pylon beam (Ref. Fig. 427).

R (p)Unlock front and rear hydraulic jack ratchets.

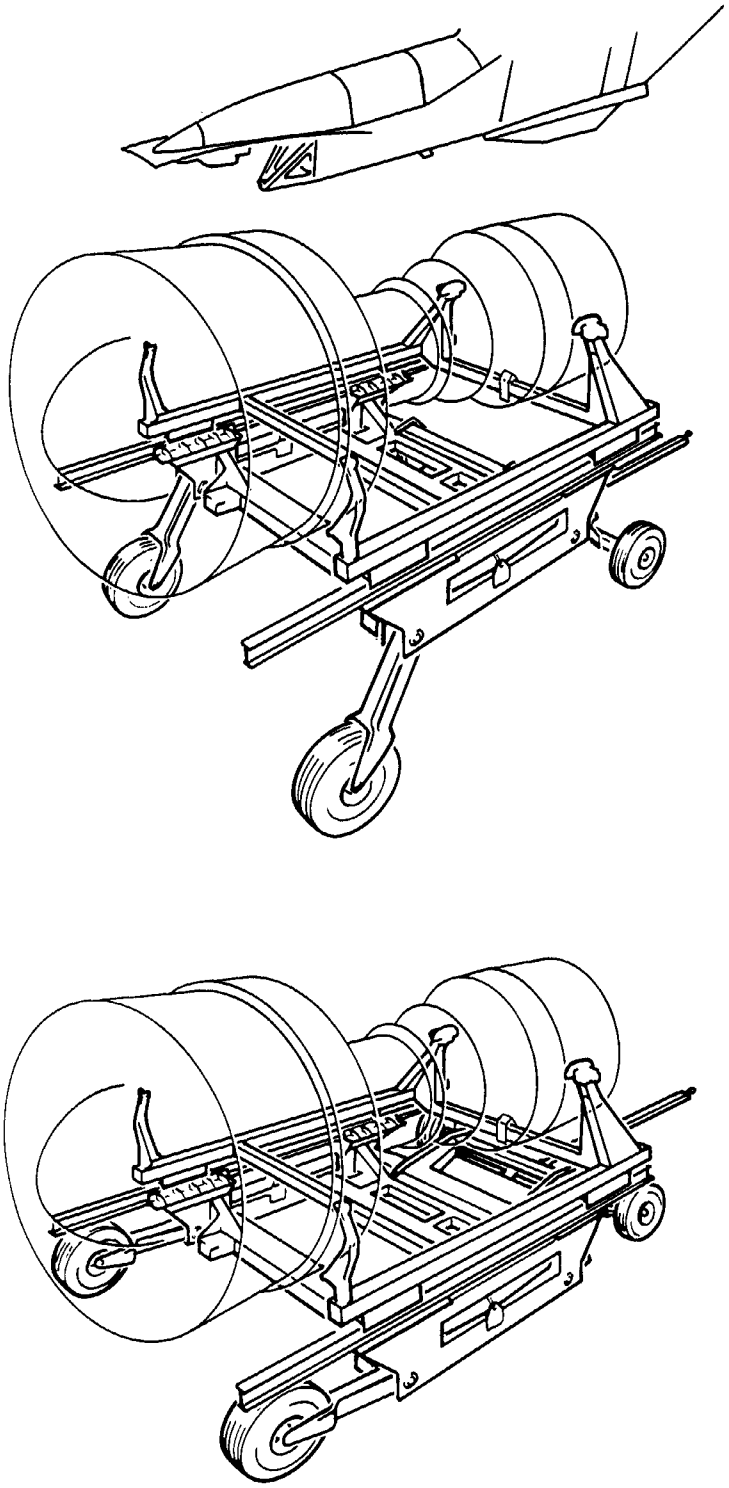
WARNING : BEFORE LOWERING PUMP ONE OR TWO STROKES UP BEFORE UNLOCKING AND RELEASING OIL RETURNS.

R (q)Open the two return valves of the two front and two rear jacks gradually and simultaneously. Keep engine center line horizontal during operation.
One observer on each side shall watch that engine is coming down without any interference.

R (r)Realign the rails with adjusting screws and install the four locating bolts.

R (s)Align rollers with corresponding points on rails, install the eight ball lock pins and tighten the eight securing clamps.

R (t)With engine clear of engine pylon, positioner may be pushed away with one man at each wheel and one man at tow bar.
Trailer shall be pushed towards wing leading edge.
Install engine on adapter cradle on trailer SMIG 277ETT (2).



BM5 71 00 00 4 LJNO - 14 - 08
DM5

Removal/Installation by Means of Hydraulic Positioner
Figure 428

E. Corrosion Prevention at Forward and Aft Attachments.

(1)Preventive maintenance.

(To be applied at each engine removal)

(a)Clean engine and pylon mount interfaces.

Check that interfaces shear and centering pins are free from any trace of lubricant or dust.

(b)Forward engine mount.

Installation of engine attaching bolts and centering spigot using lubricant (Material No. C02-060).

(c)Aft engine mount.

Install engine attaching bolts with lubricant (Material No. C02-060).

(2)Preventive modification.

In addition to the preventive maintenance (repetitive action), the following modification (one time action) are recommended to improve the corrosion resistance of concerned area :

(a)Forward engine mount

- Protect centering spigot hole, spot faces and holes of the 4 engine attachment bolts at RIB1 by a local cadmium plating (DALIC or SELECTION STANDARD equipment)
- Provide the 4 engine attachment bolt holes and spot faces with a polyurethane primer coat (Material No. 16-001B).

(b)Aft engine mount.

- Corrosion resistance of the wedge has been improved by changing the material from the 40CDV 12 steel to A286 austenitic stainless steel treated with aluminum IVD (Ion Vapor Deposit) coating on the upper and lateral faces.
- New wedges can be installed as preferred spare parts A5461193260400.

F. Preparation For Installation

NOTE : When a new equipped engine is installed, the following items must be removed from the new engine to allow hoisting.

- anti-ice ducts (Ref. Fig. 410)
- thrust reverser air supply ducts (Ref. Fig. 412)
- Interface duct/regulator valve coupling.
- Coupling connecting interface duct to starter air supply duct.
- Regulator servo-line.

(1)Check cowling for condition

(2)Check connector for condition

(3)Check exposed pylon for condition (Ref. 54-51-00, P. Block 601).

(4)Check linkage components of throttle and thrust reverser controls for correct condition and security of attachment.
Make certain that flexible controls are free from traces of wear, corrosion or rubbing.

(5)Prior to engine installation, in case of previous repair with installation of bushes in spigot holes or in tensile bolt holes (Ref. SRM 54-51-81, P. Block 201), check the bushes for damage and check that they have not migrated. In case of bush damage or migration, please contact Airbus.

(6)At forward engine mount, remove lockplates and nuts (6) and (5) (Ref. Fig. 427) (detail C). Check forward engine mount, bolts and nuts for condition, security of attachment and corrosion.
(Ref. 71-21-00, P. Block 601). Do a fluorescent-penetrant-inspection of the forward mount bolts and washers (Ref. 70-00-00, P. Block 201 and 71-21-00, P. Block 601).

(7)Check aft engine mount and bolts for condition, security of attachment and corrosion (Ref. 54-51-00, P. Block 601 and 71-22-00, P. Block 601). Do a fluorescent-penetrant-inspection of the aft engine mount bolts and washers (Ref. 70-00-00, P. Block 201 and 71-22-00, P. Block 601).
When corrosion is found on pylon lower surface around the engine aft attachment beam assembly, the beam assembly including the shim must be removed to check extent of corrosion and to allow corrosion removal (beam removal Ref. 54-51-85, P. Block 401, shim removal Ref. 54-51-86, P. Block 401).

(8)Clean engine and pylon mount interfaces. Check that interfaces shear and centering pins are free from any trace of lubricant or dust.

(9)Apply light coating of lubricant (Material No.C02-060), on aft bolt threads.

(10)Apply light coating of lubricant (Material No.C02-060), on forward bolt threads.

(11)Check running torque of forward and aft mount bolts and nuts for minimum torque of 70 lbf.in. (0.791 m.daN).

(12)Install forward engine mount (5) nuts with lockplates (6) (Ref. Fig. 427) (detail C).

G. Installation of Engine by Means of Hydraulic Positioner
(Ref. Fig. 424, 428)

WARNING : DURING LIFTING AND LOWERING BRAKES MUST NOT BE APPLIED TO WHEELS.

WHEN TRAILING EMPTY POSITIONER ALWAYS KEEP IT AS LOW AS POSSIBLE AND DRIVE AT VERY SLOW SPEED, ESPECIALLY ON BAD ROADS.

GENEROUSLY APPLY GRAPHITE GREASE TO SUPPORTING PADS OF RAILS.

ALWAYS OBSERVE THAT FRONT AND REAR ENGINE ATTACHMENTS FIXTURES DISENGAGE FROM ADAPTER CRADLE, WHEN LOWERING POSITIONER, OTHERWISE THERE IS A GREAT RISK OF RETAINING RAILS AND BENDING ADJUSTMENT SCREWS.

ALWAYS REMOVE FOUR LOCATING SCREWS BEFORE ADJUSTING RAILS CENTER LINE WITH TWO SIDE ADJUSTING SCREWS. ALWAYS INSTALL THESE FOUR SCREWS BEFORE TRAILING POSITIONER.

WHEN LOWERING POSITIONER ALWAYS MAKE CERTAIN THAT THE FOUR RATCHETS HAVE BEEN RELEASED, IF NOT STOP MOVEMENT IMMEDIATELY. PUMP UP AGAIN, RELEASE RATCHETS, AND LOWER AGAIN.

R CAUTION : SKINNY CAST YOKE (P/N 9384M43G08 OR 9384M43G09 OR 9384M43G10 OR
R 9384M43G11) CAN ONLY BE INSTALLED IF IT IS ASSOCIATED TO A
R MOVEMENT TRACEABILITY SHEET (MTS) AND IF THIS SKINNY CAST YOKE
R HAS ACCUMULATED LESS THAN 7000FC SINCE THE MTS CREATION. IF NO
R MTS ATTACHED, CREATE ONE (TEMPLATE ATTACHED TO THE AOT 71A2036
R FOR A310 A/C AND AOT 71A6029 FOR A300-600 A/C).

CAUTION : DO A CHECK OF THE ENGINE DATA PLATE TO MAKE SURE THAT THE ENGINE IS CORRECT FOR THE AIRCRAFT.
IF YOU INSTALL AN ENGINE THAT DOES NOT HAVE THE CORRECT CONFIGURATION FOR THE AIRCRAFT :
- DAMAGE TO EQUIPMENT CAN OCCUR IF YOU OPERATE THE ENGINE.
- THE TEST AFTER THE INSTALLATION WILL TELL YOU THE ENGINE CONFIGURATION IS NOT CORRECT AND MORE WORK WILL BE NECESSARY.

(1)Procedure with engine to pylon preloading (recommended procedure).

NOTE : Hydraulic positioner must be equipped with load measurement device which can give the load repartition (forward and aft position) and warning to prevent the overload.

(a)Install engine and cradle assembly on hydraulic positioner.
(b)Clean thoroughly bolts, nuts, spigots corresponding holes, contact surfaces to eliminate deposits of grease.
(c)Apply Material No.C02-060 to the forward mount alignment pin (thrust pin) and alignment pin hole and aft mount alignment pins. Also apply Material No.C02-060 to forward and aft engine mount (contact surfaces to pylon).
(d)With a plumb line and a piece of chalk project center line of nacelle and mark position on ground.
(e)With towbar directed towards wing trailing edge make a long approach and align engine center line with chalk mark.
(f)Stop trailer when suspension points of engine pylon are approximately

aligned with corresponding points of engine.

(g)Unlock the eight clamps of rollers and shake them to make certain that they are free.

(h)Remove the four locating bolts on the roller supporting pads of the positioner.

R (j)Remove the eight lock pins from rollers and retain.

R (k)Check indicators for correct operation. On both indicators, read value F shown.

R (l)Set warning value as follows :
- Forward indicator : F + 300 daN (675 lbf.)
- Aft indicator : F + 200 daN (450 lbf.)

R (m)Remove the two lock pins at the base of front adapter and two lock pins at rear brackets.

R (n)With one man at each hydraulic pump raise engine evenly (observe fluid levels).

R (p)One man on each side shall observe that engine is clear of cowls whilst raising.

R (q)Continue to raise engine until centering spigot of forward mount and the two centering spigots of aft mount are correctly engaged.
CAUTION : USE DEVICE WITH EXTREME CARE WHEN RAISING ENGINE TO FINAL. POSITION OR DAMAGE TO MOUNTS AND PYLON COULD RESULT.

R (r)Lightly coat engine forward mount bolt threads (3) and spigot with Material No.C02-060.

R (s)Lightly coat engine aft mount bolt threads and washers (1) (2) and index pins with Material No.C02-060 (Ref. Fig. 427).

R (t)Install forward mount bolts (3), with washers (4) under bolts heads, then nuts (5) and retainer assemblies (6). Install rear bolts (1) with washers (2) under bolts heads.
CAUTION : MOUNT BOLTS HAVE A FILLET BETWEEN HEAD AND SHANK. THE WASHER INNER DIAMETER IS CHAMFERED ON ONE SIDE ONLY THEREFORE MUST BE INSTALLED WITH CHAMFERED SIDE AGAINST BOLT HEAD.

R (u)Slow down engine raising.
Check carefully that during approach, engine and pylon forward and aft mount mating surfaces remain always parallel.

R (v)Monitor the load indicators and raise the positioner with extreme care until the warning values are reached.

R (w)TORQUE diagonally opposed bolts of the forward mount to between 450 and 500 lbf.ft. (61 and 67.6 m.daN)

R (x)TORQUE diagonally opposed bolts of the aft mount to between 450 and 500 lbf.ft. (61 - 67.6 m.daN).

R (y)Wirelock rear mount bolts.

R (aa)Wirelock front mount bolts.

R (ab)Install sleeve spigot attachment bolt, TORQUE to between 450 and 500 lbf.ft. (61 - 67.6 m.daN). Secure with lockplate (Ref. Fig. 402).

R (ac)Remove hydraulic positioner (or equivalent)

1 Make certain that front and rear bracket safety lock pins are removed and that the eight lock pins and eight clamps are clear.

2 Unlock the front and rear jack ratchets. Apply a slight hydraulic pressure at both front and rear pumps. Make certain that ratchets are disengaged.
WARNING : BEFORE LOWERING PUMP ONE OR TWO STROKES UP BEFORE

UNLOCKING AND RELEASING OIL RETURN.

3 Lower the positioner gradually and evenly (observe fluid levels). One man on each side shall observe that there is no interference with engine during lowering.

4 Remove the four engine attachment fixtures and lower yoke from engine and install on cradle. Install the eight lock pins on rollers and tighten the eight clamps.

5 Lower positioner sufficiently to be pulled away from aircraft towards wing trailing edge.

6 Align the two rails with adjusting screws and install the four locating bolts and lock pins.

(2)Procedure with gap between engine and pylon (alternate procedure).

(a)Install engine and cradle assembly on hydraulic positioner.

(b)Apply Material No.C02-060 to the forward mount alignment pin (thrust pin) and alignment pin hole and aft mount alignment pins. Also apply Material No.C02-060 to forward and aft engine mount (contact surfaces to pylon).

(c)With a plumb line and a piece of chalk project center line of nacelle and mark position on ground.

(d)With towbar directed towards wing trailing edge make a long approach and align engine center line with chalk mark.

(e)Stop trailer when suspension points of engine pylon are approximately aligned with corresponding points of engine.

(f)Unlock the eight clamps of rollers and shake them to make certain that they are free.

(g)Remove the four locating bolts on the roller supporting pads of the positioner.

(h)Remove the eight lock pins from rollers and retain.

R (j)Remove the two lock pins at the base of front adapter and two lock pins at rear brackets.

R (k)With one man at each hydraulic pump raise engine evenly (observe fluid levels).

R (l)One man on each side shall observe that engine is clear of cowls whilst raising.

R (m)Continue to raise engine until centering spigot of forward mount and the two centering spigots of aft mount are correctly engaged.

CAUTION : USE DEVICE WITH EXTREME CARE WHEN RAISING ENGINE TO FINAL. POSITION OR DAMAGE TO MOUNTS AND PYLON COULD RESULT.

R (n)Lightly coat engine forward mount bolt threads (3) and spigoet with Material No.C02-060.

R (p)Lightly coat engine aft mount bolt threads and washers (1) (2) and index pins with Material No.C02-060 (Ref. Fig. 427)

R (q)Install forward mount bolts (3), with washers (4) under bolts heads, then nuts (5) and retainer assemblies (6). Install rear bolts (1) with washers (2) under bolts heads.

CAUTION : MOUNT BOLTS HAVE A FILLET BETWEEN HEAD AND SHANK. THE WASHER INNER DIAMETER IS CHAMFERED ON ONE SIDE ONLY THEREFORE MUST BE INSTALLED WITH CHAMFERED SIDE AGAINST BOLT HEAD.

R (r)Slow down engine raising.

Check carefully that during approach, engine and pylon forward and aft mount mating surfaces remain always parallel.

R (s)Continue to raise engine slowly until a gap of 6 mm (1/14 in.) is left.
R (t)TORQUE diagonally opposed bolts of the forward mount to between 450 and 500 lbf.ft. (61 and 67.6 m.daN).
R (u)TORQUE diagonally opposed bolts of the aft mount to between 450 and 500 lbf.ft. (61 - 67.6 m.daN)
R (v)Wirelock rear mount bolts.
R (w)Wirelock front mount bolts.
R (x)Install sleeve spigot attachment bolt, TORQUE to between 450 and 500 lbf.ft. (61 - 67.6 m.daN). Secure with lockplate (Ref. Fig. 402)
R (y)Remove hydraulic positioner (or equivalent)

1 Make certain that front and rear bracket safety lock pins are removed and that the eight lock pins and eight clamps are clear.
2 Unlock the front and rear jack ratchets. Apply a slight hydraulic pressure at both front and rear pumps. Make certain that ratchets are disengaged.

WARNING : BEFORE LOWERING PUMP ONE OR TWO STROKES UP BEFORE UNLOCKING AND RELEASING OIL RETURN.

3 Lower the positioner gradually and evenly (observe fluid levels). One man on each side shall observe that there is no interference with engine during lowering.
4 Remove the four engine attachment fixtures and lower yoke from engine and install on cradle. Install the eight lock pins on rollers and tighten the eight clamps.
5 Lower positioner sufficiently to be pulled away from aircraft towards wing trailing edge.
6 Align the two rails with adjusting screws and install the four locating bolts and lock pins.

H. Installation of Engine by Means of the Engine Bootstrap
(Ref. Fig. 422, 424, 426)

WARNING : - MAKE SURE THAT DURING ENGINE LOWERING PROCEDURE THE STIRRUPS OF REAR BEAM CABLE DO NOT JAM IN THE PULLEYS.
FOR THIS PURPOSE MAKE CERTAIN THAT CABLE LENGTH IS EQUAL ON EITHER SIDE OF THE BOOTSTRAP.
- VALUES ON DYNAMOMETERS MUST BE CLOSELY MONITORED.
- IN CASE OF JAMMING OF THE STIRRUPS OF REAR BEAM CABLE IN THE PULLEYS, OVERLOADS CAN BE APPLIED ON THE PYLON AFT HOIST FITTINGS WITH A POSSIBLE FAILURE AT TOOLING ATTACHMENTS WHICH COULD LEAD TO THE ENGINE FALL WITH AS A POSSIBLE CONSEQUENCE SERIOUS INJURY TO PERSONNEL.
- IF OVERLOADS ARE APPLIED AS A PREVENTIVE MEASURE PYLON AFT HOIST FITTINGS AND BOLTS MUST BE SYSTEMATICALLY REPLACED.

R CAUTION : SKINNY CAST YOKE (P/N 9384M43G08 OR 9384M43G09 OR 9384M43G10 OR
R 9384M43G11) CAN ONLY BE INSTALLED IF IT IS ASSOCIATED TO A
R MOVEMENT TRACEABILITY SHEET (MTS) AND IF THIS SKINNY CAST YOKE
R HAS ACCUMULATED LESS THAN 7000FC SINCE THE MTS CREATION. IF NO
R MTS ATTACHED, CREATE ONE (TEMPLATE ATTACHED TO THE AOT 71A2036
R FOR A310 A/C AND AOT 71A6029 FOR A300-600 A/C).

CAUTION : DO A CHECK OF THE ENGINE DATA PLATE TO MAKE SURE THAT THE ENGINE IS CORRECT FOR THE AIRCRAFT.
IF YOU INSTALL AN ENGINE THAT DOES NOT HAVE THE CORRECT CONFIGURATION FOR THE AIRCRAFT :
- DAMAGE TO EQUIPMENT CAN OCCUR IF YOU OPERATE THE ENGINE.
- THE TEST AFTER THE INSTALLATION WILL TELL YOU THE ENGINE CONFIGURATION IS NOT CORRECT AND MORE WORK WILL BE NECESSARY.

Post SB GE 75-122

(1)Remove LPT cooling air manifold segments at 11 and 1 o'clock positions (Ref. 71-00-00, P. Block 401, Para. 3.C.).

End Post SB GE 75-122

(2)Position engine removal/installation trailer complete with replacement engine between pulley blocks equipped with their dynamometers and lifting stirrups.

(3)Install lifting stirrups on adapter cradle. They should be locked in "WING ENGINE" holes.

(4)Check the warning values are set to 2350 daN (5282 lbf.) on each forward dynamometer, and 1100 daN (2472 lbf.) on the aft dynamometer.

(5)Free pins attaching adapter cradle to trailer.

(6)Unlock rollers on trailer chassis.

(7)Place pulley blocks locking levers in up position and raise adapter cradle slightly to disengage it from trailer.

(8)Slightly raise the forward section of engine/adapter cradle assembly, then the aft section.

(9)Note load indicated on front and rear dynamometers.

(10)Raise engine cradle adapter assembly using the four pulley blocks, checking that assembly is level, until front and rear centering pins are engaged in their locking holes and mating faces of the engine mounts and corresponding pylon attachment points make contacts.

WARNING : - MAKE SURE THAT DURING ENGINE LOWERING PROCEDURE THE STIRRUPS OF REAR BEAM CABLE DO NOT JAM IN THE PULLEYS.

FOR THIS PURPOSE MAKE CERTAIN THAT CABLE LENGTH IS EQUAL ON EITHER SIDE OF THE BOOTSTRAP.
- VALUES ON DYNAMOMETERS MUST BE CLOSELY MONITORED.
- IN CASE OF JAMMING OF THE STIRRUPS OF REAR BEAM CABLE IN THE PULLEYS, OVERLOADS CAN BE APPLIED ON THE PYLON AFT HOIST FITTINGS WITH A POSSIBLE FAILURE AT TOOLING ATTACHMENTS WHICH COULD LEAD TO THE ENGINE FALL WITH AS A POSSIBLE CONSEQUENCE SERIOUS INJURY TO PERSONNEL.
- IF OVERLOADS ARE APPLIED AS A PREVENTIVE MEASURE PYLON AFT HOIST FITTINGS AND BOLTS MUST BE SYSTEMATICALLY REPLACED.

CAUTION : USE DEVICE WITH EXTREME CARE WHEN RAISING ENGINE TO FINAL POSITION OR DAMAGE TO MOUNTS AND PYLON COULD RESULT.

(11)Raise engine gradually so that a light additional load is indicated on each of the front and rear dynamometers to make certain that engine is correctly seated on mountings.

NOTE : The maximum preload allowed is :
- 150 daN (337.8 lbf.) on each forward dynamometer
- 100 daN (225 lbf.) on aft dynamometer.

(12)Not applicable.

(13)Lightly coat engine forward mount bolt threads (3) and spigot with lubricant (Material No. C02-060) (Ref. Fig. 427).

(14)Lighty coat engine aft mount bolt threads and washers (1) (2) and index pins with lubricant (Material No.C02-060). (Ref. Fig. 427) (Detail B and C).

(15)Install front mount bolts (3), washers (4) under bolt heads, then nuts (5) and retainer assemblies (6). Install rear mount bolts (1) with washer (2) under bolt heads (Ref. Fig. 427).

CAUTION : MOUNT BOLTS HAVE A FILLET BETWEEN HEAD AND SHANK. THE WASHER INNER DIAMETER IS CHAMFERED ON ONE SIDE ONLY AND THEREFORE MUST BE INSTALLED WITH CHAMFERED SIDE AGAINST BOLT HEAD.

(16)With nuts held stationary, turn mount bolts into place.

(17)TORQUE diagonally opposed bolts of the forward mount to between 450 and 500 lbf. ft. (61 - 67.6 m.daN).

(18)TORQUE diagonally opposed bolts of the aft mount to between 450 and 500 lbf.ft. (61 - 67.6 m.daN).

(19)Wirelock aft mount bolts and forward mount bolts.

(20)Remove engine removal/installation equipment

(a)Place pulley blocks locking levers in down position and slightly slacken off pulleys blocks.

(b)Remove quick release pins attaching front fixtures of the adapter cradle. Un-pin the rear fixtures from engine and push them fully back in their housings in adapter cradle.

(c)Remove bolt from rear lower yoke.

(d)Lower adapter cradle making certain that there is no interference between engine and adapter cradle.

(e)Continue to lower adapter cradle until it rests on trailer. Lock rollers to trailer chassis.

(f)Remove successively the stirrups, dynamometers and pulley blocks.

(g)Remove front and rear main beams, beginning with side arms.

(h)Remove shoe (7), backing plate (6) and channel (9) from engine pylon.

Post SB GE 75-122

R (j)Install LPT cooling air manifold segments at 11 and 1 o'clock positions (Ref. 71-00-00, P. Block 401, Para. 3.C.).

End Post SB GE 75-122

R (k)Install pylon leading edge fairing with the six screws and TORQUE to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(21)Install sleeve and spigot attachment bolt, TORQUE to between 450 and 500 lbf.ft. (61-67.6 m.daN).
Secure with lockplate (Ref. Fig. 402).

R J. Connection of Engine to Pylon

(1)Attach left and right engine aft mount access panels to pylon fairing. (Ref. Fig. 420). Torque screws to between 20 and 25 lbf. in. (0.23 and 0.28 m.daN).

(2)Remove protective covers from hoses and cuts.

(3)Connect fan case anti-ice ducts.

(a)Remove bolts, washers, and nuts attaching support links to fan case forward and aft ducts. (Ref. Fig. 409)

(b)Position union and seals between forward and aft ducts and connect with retaining nuts.

(c)Using spanner set RSE1071 and TORQUE nuts to 55 lbf. ft. (7.46 m.daN)

(d)Slide housing on aft duct up to flange on forward duct and connect with coupling and seal.

(e)TORQUE coupling to between 85 and 100 lbf. in. (0.96 and 1.13 m.daN) and tap perimeter of coupling with soft faced hammer.

(f)Repeat torque/tap procedure twice, then retorque.

(g)Adjust support links as required to eliminate preload on forward and aft ducts.

(h)Attach links to ducts with bolts, washers, and nuts.

R (j)TORQUE nuts to between 50 and 70 lbf. in. (0.56 and 0.79 m.daN) and wirelock.

**ON A/C 001-100,

(4)Connect the TRAS Lock System power cable (Ref. Fig. 404)

(a)Connect the TRAS lock system power cable to the pylon fan case junction box.

(b)Tighten the connector fingertight plus one-eighth turn.

(c)Install the screws, washers, nuts and clamps that attach the TRAS lock system power cable to the fan case.

(d)TORQUE the nuts to between 57 and 67 lbf. in. (0.64 and 0.76 m.daN).

**ON A/C 001-100,

(5)Connect electrical connectors VC4952P, VC4955P, and VC4950P to pylon fan case junction box.

(a)Tighten connectors fingertight plus one eight turn (Ref. Fig. 403).

(6)Install core anti-ice ducts.

(a)Remove bolts, washers, and nuts attaching support links to valve outlet duct. (Ref. Fig. 410)

(b)Connect engine mount duct to valve outlet duct with coupling and seal.

(c)Connect upper bifurcation duct to engine mount duct and to fireseal adapter with couplings.

(d)TORQUE couplings to between 115 and 125 lbf. in. (1.30 and 1.41 m.daN) and tap perimeter of couplings with soft faced hammer.

(e)Repeat torque/tap procedure twice, then retorque.

(f)Adjust support links as required to eliminate preload on anti-ice ducts.

R (g)Attach links to valve outlet duct with bolts, washers, and nuts.
R (h)TORQUE nuts to between 50 and 70 lbf. in. (0.56 and 0.79 m.daN) and
R wirelock.
R (7)Connect core wire harnesses to the pylon.

**ON A/C 001-100,

(a)Connect electrical power harness :
(Ref. Fig. 405)
1 Inspect electrical power harness for damage.
2 If insulation on the IDG power wire harness assembly is not damaged, install electrical power harness. (Ref. 71-52-01, P. Block 401, Para. C.(1)).
3 If damage is found : (Ref. 71-52-01, P. Block 201).

**ON A/C 001-100,

(b)Tighten connector fingertight harness (connectors VC 4968P, plus one-eighth turn. Install lockwire.
(c)Connect left core zone electrical harness (connectors VC4968P, VC4959P, VC4963P, VC4961P, VC4962P, and VC4969P) to pylon junction box.
(d)Tighten connectors fingertight plus one-eighth turn. (Ref. Fig. 406)
(e)Connect right core zone electrical harness (connectors VC4960P (if equipped), VC4967P, VC4965P, VC4970P and VC4966P) to pylon junction box.
(f)Tighten connectors fingertight plus one-eighth turn. (Ref. Fig. 407)
(g)Connect the hydraulic line for the thrust reverser opener as follows :
1 Remove the caps from the line and the connector on the fan case.
2 Connect the hand pump to the hydraulic connector for the thrust reverser at the bottom left side of the fan case.
3 Operate the hand pump until oil comes out of the open end of the hydraulic line.
4 Remove the hand pump.
5 Connect the hydraulic line of the thrust reverser opener (Ref. Fig. 408).
(h)Install quick disconnect brackets on pylon (Ref. Fig. 407).
(8)Connect hydraulic hoses to pylon interface
(a)Start at forward end of hose connection panel and working aftward. (Ref. Fig. 411)
(b)Connect hydraulic junction box drain hose.
(c)Connect left case drain hose to upper case drain connection and right case drain hose to lower case drain connection.
(d)TORQUE hose coupling nuts to between 215 and 245 lbf. in. (2.43 and 2.77 m.daN).
(e)Connect upper and lower pump quick-disconnect suction hoses to panel.

NOTE : Use a strap wrench to make certain that quick disconnect is correctly connected.

(f)Connect upper and lower pump pressure hoses to panel.

(g)TORQUE pressure hose coupling nuts to between 900 and 1000 lbf. in. (10.17 and 13.0 m.daN).

(9)Connect the pneumatic interface duct to the pylon.

CAUTION : THERE MUST BE NO PRELOAD ON THE DUCT AFTER FINAL ASSEMBLY AND ADJUSTMENT. A PRELOAD CONDITION CAN CAUSE FAILURE OF THE DUCTS AND THE SUBSEQUENT EMISSION OF HOT GASES INTO THE CORE AREA.

(a)Remove bolts, washers, and nuts that attach the support links to the intersect duct (Ref. Fig. 414).

(b)Connect the interface duct to the pylon duct with the coupling.

(c)TORQUE the couplings of the interface duct to between 115 and 125 lbf.in. (1.30 and 1.41 m.daN) and tap the perimeter of the couplings with a soft faced hammer.

(d)Do the torque/tap procedure again, two times, then torque again.

(e)Adjust the intersect duct support links so there is no preload on the ducts (Ref. Fig. 429).

1 Make sure that the bolt holes in the link and bracket clevises align. Loosen the jamnuts and adjust if necessary.

2 Install the links and the shear bolts at the intersect duct. Make sure that there is no tension or compression in the links when installed. Loosen the jamnuts and adjust if necessary.

3 Make sure that you can see the link shanks in the witness holes of the link body.

(f)Install the washers and nuts to the link bolts.

(g)TORQUE the nuts to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN).

(10)Install the thrust reverser supply ducts.

CAUTION : THERE MUST BE NO PRELOAD ON THE THRUST REVERSER SUPPLY DUCTS OR T/R VALVE AIR TUBES AFTER FINAL ASSEMBLY AND ADJUSTMENT. A PRELOAD CONDITION CAN CAUSE FAILURE OF THE DUCTS AND THE SUBSEQUENT EMISSION OF HOT GASES INTO THE CORE AREA.

NOTE : A preload condition is a clearance or misalignment/sprung condition at the mating flanges larger than 0.050 in. (1.27 mm) for the upper supply duct connected to the fireseal adapter, 0.050 in. (1.27 mm) for the upper supply duct connected to the lower supply duct, and 0.050 in. (1.27 mm) for the lower supply duct connected to the regulator duct.

(a)Connect the lower supply duct to the regulator duct with the coupling and seal. Install the coupling loosely (Ref. Fig. 412).

(b)Connect the upper supply duct to the lower supply duct and the fireseal adapter with the couplings and seals. Install the couplings loosely (Ref. Fig. 412).

(c)Connect the TLOD supply tube to the Y-Check Valve. Tighten hand tight. (Ref. Fig. 413)

(d)Connect the TLOD supply tube at the pylon connection. Tighten hand tight.

(11)Loosen the thrust reverser valve air tube connection at the interface duct (Ref. Fig. 430).

(12)Loosen the thrust reverser valve air tube connection at the intersect duct (Ref. Fig. 429).

NOTE : All the duct connections to the thrust reverser pressure regulating and shut-off valve (PRSOV) are now loose.

(13)Adjust the PRSOV support links (Ref. Fig. 431).
   (a)Remove the bolts, nuts, and washers which attach the support links to the thrust reverser PRSOV bracket and the PRSOV.
   (b)Measure each support link from center to center of the bolt holes. You must adjust the upper support link to 2.56 in. (65 mm). You must adjust the lower support link to 2.68 in. (68 mm).
   (c)Make sure that you can see the link shanks in the witness holes.
   (d)Install the links to the PRSOV and PRSOV bracket with the shear bolts at the two ends of the link assemblies.
   (e)Install the washers and nuts to the link bolts.
   (f)TORQUE the nuts to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN).
(14)Do a check for preload on the thrust reverser supply ducts and valve air tubes. Lightly turn the supply ducts and valve air tubes as necessary to align the flanges and remove preload.

CAUTION : THERE MUST BE NO PRELOAD ON THE THRUST REVERSER SUPPLY DUCTS OR T/R VALVE AIR TUBES AFTER FINAL ASSEMBLY AND ADJUSTMENT. A PRELOAD CONDITION CAN CAUSE FAILURE OF THE DUCTS AND SUBSEQUENT EMISSION OF HOT GASES INTO THE CORE AREA.

NOTE : A preload condition is a clearance or misalignment/sprung condition at the mating flanges larger than 0.050 in. (1.27 mm) for the upper supply duct connected to the fireseal adapter, the upper supply duct connected to the lower supply duct, the valve air tube connected to the intersect duct, 0.100 in. (2.54 mm) for the valve air tube connected to the interface duct, and 0.050 in. (1.27 mm) for the lower supply duct connected to the regulator duct.

(15)Tighten the thrust reverser valve air tube connection at the intersect duct.
   (a)TORQUE the couplings at the duct interfaces to between 40 and 50 lbf.in. (0.45 and 0.56 m.daN) and tap the perimeter of the couplings with a soft faced hammer.
   (b)Do the torque/tap procedure again, two times, then torque again.
   (c)Examine the other flanges which have not been tightened, to see if they are aligned. Realign these flanges as necessary before you continue.
(16)Tighten the thrust reverser valve air tube connection at the interface duct.
   (a)TORQUE the couplings at the duct interfaces to between 40 and 50 lbf.in. (0.45 and 0.56 m.daN) and tap the perimeter of the couplings with a soft faced hammer.
   (b)Do the torque/tap procedure again, two times, then torque again.
   (c)Examine the other flanges which have not been tightened, to see if they are aligned. Realign these flanges as necessary before you continue.
(17)Tighten the upper supply duct connection at the fireseal adapter.
   (a)TORQUE the couplings at the duct interfaces to between 65 and 70 lbf.in. (0.73 and 0.79 m.daN) and tap the perimeter of the couplings with a soft faced hammer.
   (b)Do the torque/tap procedure again, two times, then torque again.

(c)Examine the other flanges which have not been tightened, to see if they are aligned. Realign these flanges as necessary before you continue.
(d)TORQUE the TLOD tube connection at the Y-Check Valve to between 262 and 308 lbf.in. (2.96 and 3.48 m.daN).
(e)TORQUE the P-Clamp on the PRSOV tube to between 32 and 38 lbf.in. (0.36 and 0.43 m.daN).
(f)TORQUE the TLOD tubing pylon connection to between 262 and 308 lbf.in. (2.96 and 3.48 m.daN).
(18)Tighten the upper supply duct connection at the lower supply duct.
(a)TORQUE the couplings at the duct interfaces to between 65 and 70 lbf.in. (0.73 and 0.79 m.daN) and tap the perimeter of the couplings with a soft faced hammer.
(b)Do the torque/tap procedure again, two times, then torque again.
(c)Examine the other flanges which have not been tightened, to see if they are aligned. Realign these flanges as necessary before you continue.
(19)Tighten the lower supply duct connection at the regulator duct.
(a)TORQUE the couplings at the duct interfaces to between 65 and 70 lbf.in. (0.73 and 0.79 m.daN) and tap the perimeter of the couplings with a soft faced hammer.
(b)Do the torque/tap procedure again, two times, then torque again.
(20)Adjust the PRSOV support links so there is no preload on the ducts (Ref. Fig. 431).
(a)Remove the bolts, nuts, and washers that attach the support links to the PRSOV bracket.
(b)Make sure that the bolt holes in the link and bracket clevises align. Loosen the link jamnuts and adjust if necessary.
(c)Install the links and the shear bolts at the PRSOV bracket and make sure that there is no tension or compression in the links when installed. Loosen the jamnuts and adjust if necessary.
(d)Make sure that you can see the link shanks in the witness holes of the link body.
(e)Install the washers and nuts to the link bolts.
(f)TORQUE the nuts to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN).
(21)Connect hydraulic pressurization hose on 14th stage manifold to Engine 1. Install the plug into Engine 2, 14th stage manifold.
(a)TORQUE hose coupling nut to between 125 and 140 lbf. in. (1.41 and 1.58 m.daN). (Ref. Fig. 415)

**ON A/C 001-100,

(22)Attach main fuel supply hose, new gasket, and fuel leak deflector to pylon with bolts and washers.
(a)TORQUE bolts to between 75 and 85 lbf. in. (0.85 and 0.96 m.daN) and wirelock (Ref. Fig. 416).
(23)Connect throttle control cable. (Ref. Fig. 417)
(a)Rig primary transmission crank lever (access through panel 414ER (424ER)) in the position corresponding to 80° on engine with rigging pin 99A76101501000.
R (b)Insert rig pin RSE1041-1 through flange of fuel control body and engage

slot on power lever at 80 degree rig position.
(c)Install throttle cable cooling shroud and connect throttle control cable to throttle control box rod (Ref. 76-11-41, P. Block 401).
(d)Install the throttle control cable into the quick-disconnect clamps (two places) (Ref. Fig. 417).
(e)Install the upper coupling bellows.
(f)Install the throttle control cable onto the engine with the applicable screws, washers, nuts and clamps (seven places). TORQUE the screws to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN) and wirelock.
(g)Remove the rigging pin (99A76101501) from the throttle control primary relay.
R (h)Remove rig pin RSE1041-1.
R (j)Install the access panels 414ER (424ER).
(24)Connect pneumatic sense hose to pylon.
(a)TORQUE hose coupling nut to between 180 and 200 lbf. in. (2.03 and 2.26 m.daN). (Ref. Fig. 418)
(25)Connect pylon drain hose (Ref. Fig. 418)
(26)Connect connector to fan air valve 51HA (52HA).
(27)Connect fan air valve hose to fan air valve and connect gearbox extinguishing hose to pylon duct.
(a)TORQUE fan air valve hose coupling nut to between 180 and 200 lbf. in. (2.03 and 2.26 m.daN) (Ref. Fig. 419).
(b)TORQUE gearbox extinguishing hose coupling nut to between 410 and 450 lbf. in. (4.63 and 5.08 m.daN).
(28)Remove cowl hold open braces (Ref. Fig. 401)
(a)Disengage support hooks from fan and core cowls.
(b)Raise and support fan and core cowls with cowl telescopic hold open rods
(c)Remove support arms from hooks.
(d)Raise and support fan thrust reverser cowls with the cowl hold-open rod.
(e)Remove tube assy junction (4) (5).
(f)Loosen the 6 knurled nuts and the 6 grub screws. Unscrew the guide screw (2) and retract the mobile support (3).
(g)Remove stay assy (1).
(29)Cowl Inspection
Check cowls and parts for security of attachment and correct condition
- hinges and hinge pins
- doors and cowl lower section for proper operation
- U-bolts for attachment and latch triggers for correct operation (check springs and pins for condition)
- upper latch hook for proper attachment
- forward latching system for attachment and correct condition (check ring attachment, cable and actuating mechanism)
- gutters and fire shields for condition
- pressure relief doors on fire bulkhead and retention cables for correct positioning
- check components located inside thrust reverser cowls for delamination (pipes, ducts, stainless steel skin and travel range limiter attachment)
- engine/cowl seating surfaces for condition

- air cooling outlets for obstruction.
- visually inspect thrust reverser hydraulic opening system.

(30) Do a clay check on the thrust reverser valve air tubes.
   (a) Apply a layer of clay 0.250 in. (6.35 mm) thick to the outboard side of each thrust reverser valve air tube (Ref. Fig. 432).
   (b) Close the thrust reverser half, and engage the lower latch.
   (c) Release the latch and open the thrust reverser half.
   (d) Examine the clay for an indication that it touched the thrust reverser. If the clay touched the thrust reverser, do steps 3.I.(10) through 3.I.(19) again.

(31) Close cowl doors (Ref. 71-13-00, P. Block 301).

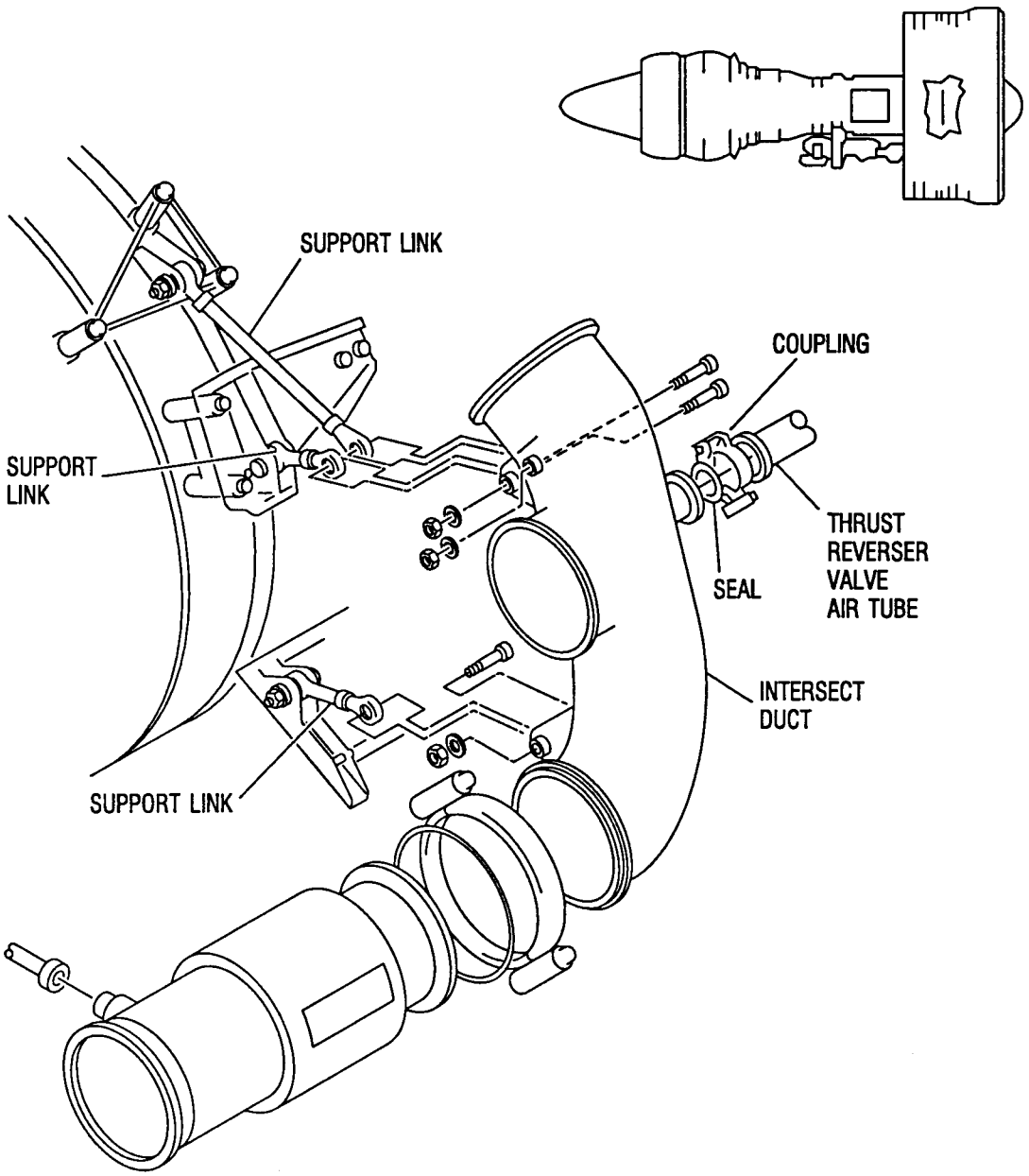
(32) Install panels 475AL(485AL) and 476AR (486AR) (Ref. Fig. 420)

R (33) Install panels 475BL (485BL) and 476BR (486BR).

R (34) Remove all ground handling and maintenance equipment, standard and special tools, together with ground power and replenishing equipment, all access equipment and miscellaneous items.

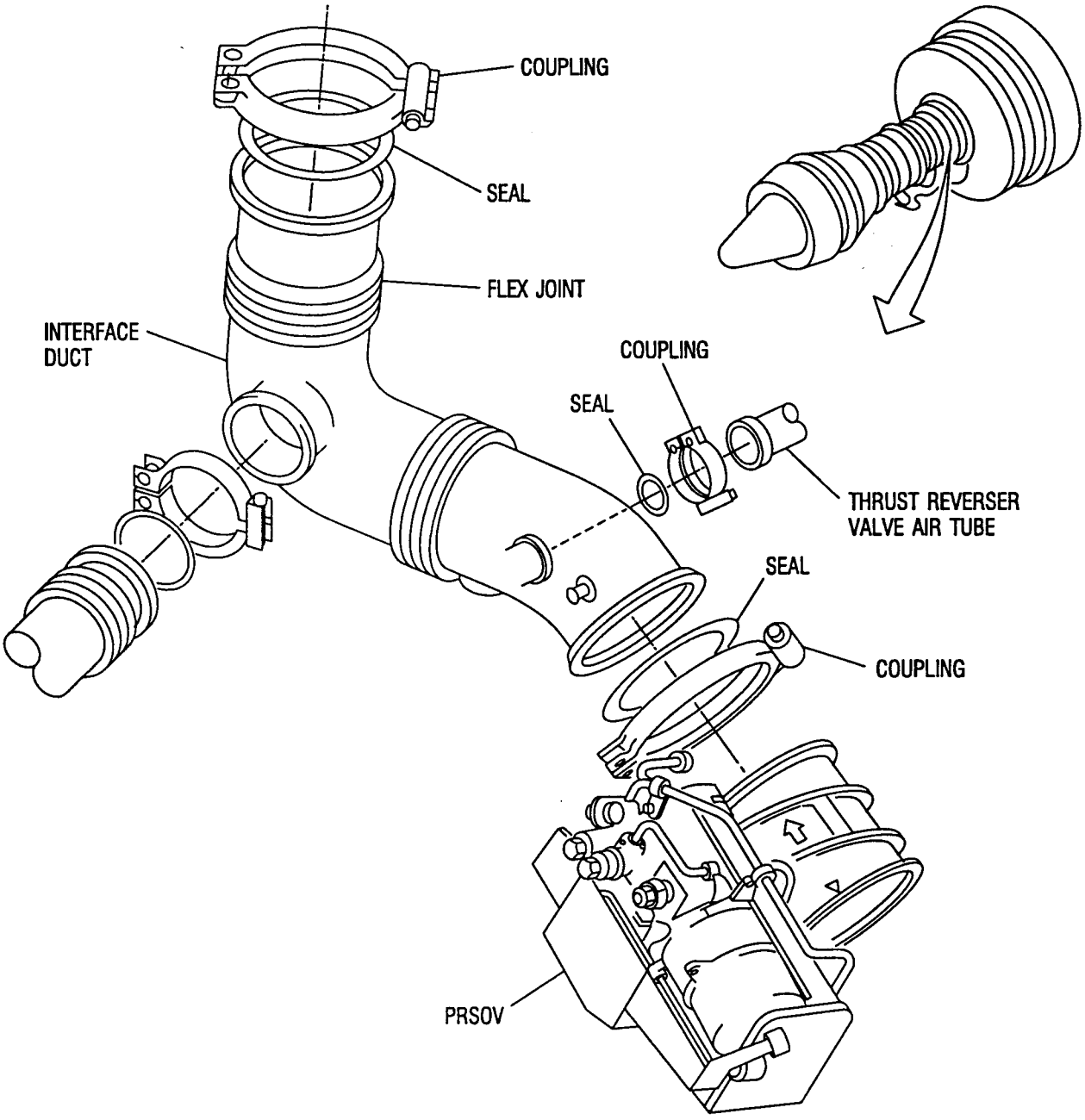
R (35) Pressurize Green and Blue (Green and Yellow) hydraulic tanks (Ref. 29-14-00, P. Block 301).

R (36) Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).



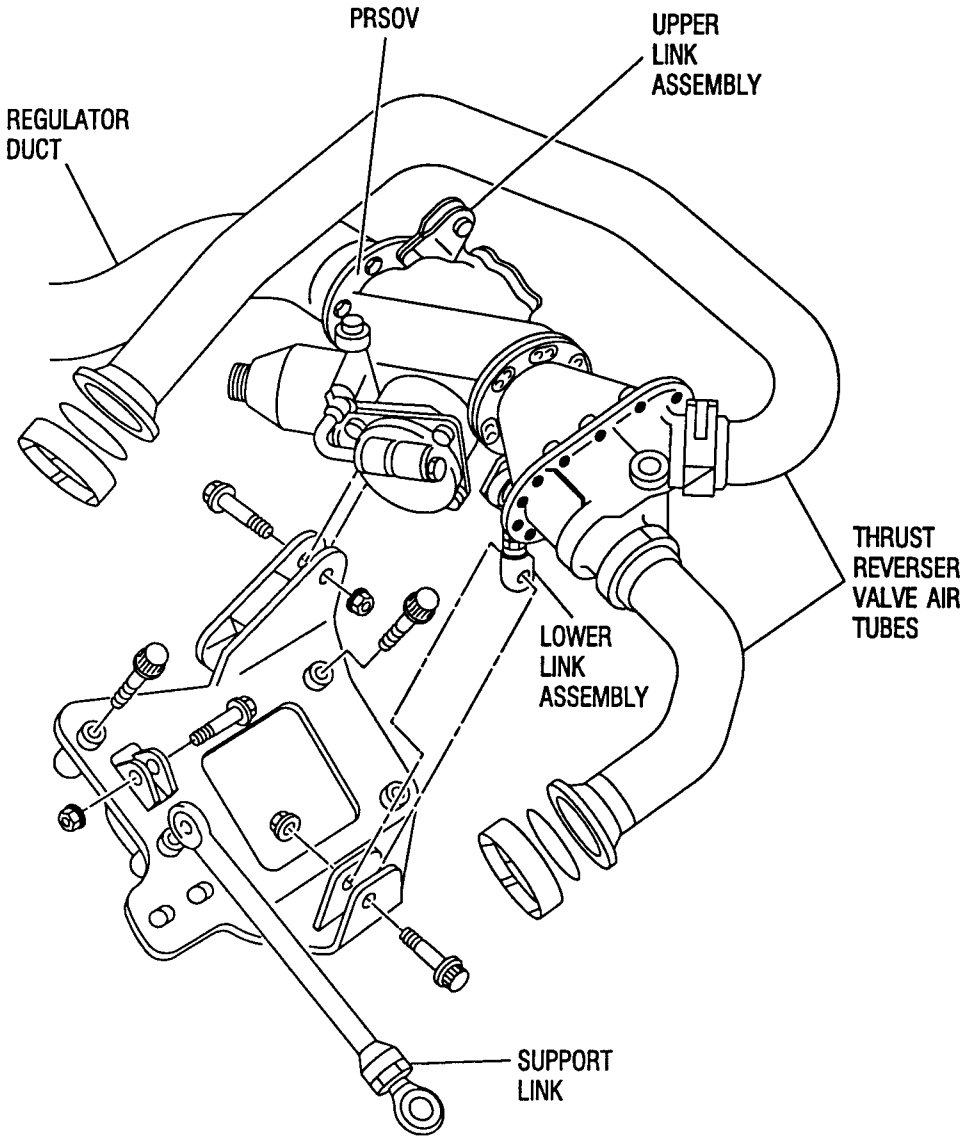
BM5 71 00 00 4 LAPO 00

Intersect Duct and Valve Air Tube
Figure 429



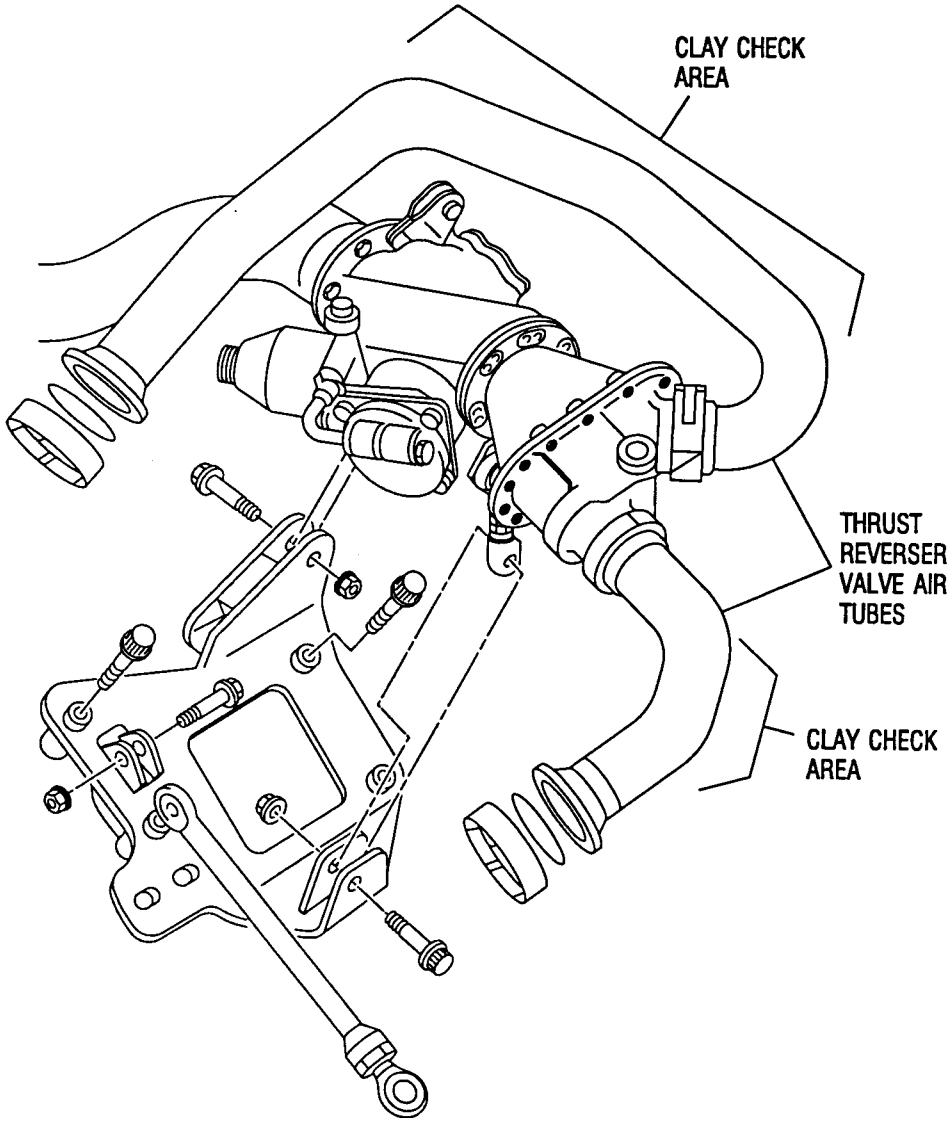
BM5 71 00 00 4 LBP0 00

Interface Duct and Valve Air Tube
Figure 430



BMS 71 00 00 4 LCP0 00

PRSOV Support Links
Figure 431



BM5 71 00 00 4 LDP0 00

Valve Air Tube Clay Check
Figure 432

R K. Test and Close-up

(1)On panel 9VU

(a)Remove rigging pin PN 98A76101003 from autothrottle coupling unit.

(b)Operate thrust and throttle control levers several times and check for binding.

In case of friction points, adjust (Ref. 76-11-00, P. Block 501).

(2)Do a check of the primary electrical bonding between the engine structure and the aircraft structure (Ref. 20-28-11, P. Block 1).

(a)Make certain that the resistance (ohmic) is not more than 1.5 milliohms between the engine and the pylon.

(3)Check levels of :

(a)Oil (Ref. 12-13-79, P. Block 1).

(b)Fuel (Ref. 12-11-28, P. Block 301).

(c)Hydraulic fluid (Ref. 12-12-29, P. Block 1).

(d)IDG (Ref. 12-13-24, P. Block 1).

(4)Pressurize Green and Blue (Green and Yellow) hydraulic systems (Ref. 29-10-00, P. Block 301).

(5)Check the ECAM system as follows :

(a)Remove safety clips and tags and close circuit breakers located in the following lines and panels :

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H10
21VU	AIDS		105/E 2 thru E5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2-STICK SHAKR		109/A 2 thru A5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16

ACTION	RESULT
1. On center pedestal - place HP fuel shut off valve control lever in ON position	On center instrument panel - OIL LO PRESS light comes on. On center pedestal, on HP fuel shut off valve control lever - HP VALVE light comes on after 3 seconds. On the ECAM DU - ENG1(2) FAIL message comes on after 70 seconds.

NOTE : If the ECAM DU page is full, this message will only be

ACTION	RESULT
displayed if you clear the previous messages.	On CAPT and F/O main instrument panels : - MASTER CAUTION light comes on - Single chime
NOTE : Disregard all other warnings. 2. On center pedestal - place HP fuel shut off valve control lever in OFF position NOTE : Disregard all other warnings.	On center pedestal on HP fuel shut off valve control lever : - HP VALVE light goes off On center instrument panel - OIL LO PRESS light goes off.
3. On ECAM control panel - press CLR pushbutton switch	On CAPT and F/O main instrument panels - MASTER CAUTION light goes off. On the ECAM DU - ENG1(2) FAIL message goes off.

(6)Check pneumatic system (Ref. 36-11-00, P. Block 501).
NOTE : Make sure that HP valve and BLEED valve are not mechanically locked and can operate freely.
(7)Check fire protection system (Ref. 26-12-00, P. Block 501 operational test)
(8)Check power management control (Ref. 73-23-00, P. Block 501).
(9)Check the engine rating code (Ref. 73-23-00, P. Block 501).
(10)Disconnect aircraft from ground power units and perform preparation prior to engine starting (close all circuit breakers).
(11)Dry motor the engine to do a leak test (Ref. 71-00-00, P. Block 501).
(12)Wet motor the engine to do a leak test (Ref. 71-00-00, P. Block 501).
WARNING : DO NOT STAND BETWEEN THE COWL DOORS WHILE YOU OPEN OR CLOSE THEM. SEVERE INJURY CAN OCCUR IF THE COWL DOORS SUDDENLY CLOSE.
(13)Close the cowl doors (Ref. 71-13-00, P. Block 301).
(14)Do an idle leaktest (Ref. 71-00-00, P. Block 501).
(15)If necessary, do an engine adjustment (Ref. 71-00-00, P. Block 501).
(16)Examine the anti-ice system (Ref. 30-21-00, P. Block 501).
(17)Examine the hydraulic pumps as follows :

ACTION	RESULT
(a)On ECAM control panel : - Make certain that SGU 1 and SGU 2 pushbutton switches are pressed in.	On R ECAM display unit.
- Press HYD pushbutton switch	- HYD page appears.
(b)On panel 427VU : - Release (out) the four HYD PWR/ PUMPS pushbutton switches.	
(c)Engine 1 On panel 427VU	
- press (in) HYD PWR/B/PUMPS ENG 1 pushbutton switch	Check Blue pressure 3000 ± 200 psi (206 ± 13.5 bars)
- release (out) HYD PWR/B/PUMPS ENG 1 pushbutton switch	Check Blue pressure decreasing
- press (in) HYD PWR/G/PUMPS ENG 1 pushbutton switch	Check Green pressure 3000 ± 200 psi (206 ± 13.5 bars)
- release (out) HYD PWR/G/PUMPS ENG1 pushbutton switch.	Check Green pressure decreasing
(d)Engine 2 On panel 427VU	
- press (in) HYD PWR/G/PUMPS ENG 2 pushbutton switch	Check Green pressure 3000 ± 200 psi (206 ± 13.5)
- release (out) HYD PWR/G/PUMPS ENG 2 pushbutton switch	Check Green pressure decreasing
- press (in) HYD PWR/Y/PUMPS ENG 2 pushbutton switch	Check Yellow pressure 3000 ± 200 psi (206 ± 13.5 bars)
ENG 2 pushbutton switch.	

(18)With both engines running, perform AC Essential Generation Switching Test (Ref. 24-25-00, P. Block 501).
(19)With engines running, perform functional test of IDG Disconnect/ Reconnect function (Ref. 24-11-00, P. Block 501, Paragraph 2.).
(20)Check the adjustment of the cowl doors and latches (Ref. 71-13-02, P. Block 501 and Ref. 71-13-03, P. Block 501).
(21)Clean air conditioning ducts (Ref. 21-51-00, P. Block 301).
NOTE : Cleaning of the air conditioning ducts is necessary :
- to prevent bad smells entering the aircraft.
- when the engine is removed following oil overconsumption
- when oil contamination of ducts is evidenced.
(22)Check level of hydraulic fluid (Ref. 12-12-29, P. Block 1).
(23)Remove warning notices from panel 436VU and HP ground connector.

R WARNING : SAFETY AREAS MUST BE CLEAR OF PERSONNEL, EQUIPMENT TOOLS, AND FOREIGN OBJECTS.
- CHECK THAT LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS 98F10103500 ARE IN POSITION AND PARKING BRAKE IS USED.
- THE NOSE GEAR STEERING HAS TO BE ACTIVE DURING THE MPA CHECK.
- RUNWAY SHOULD BE DRY, CLEAN, FLAT AND IN CONCRETE PAVEMENT. ASPHALT COULD DAMAGE THE ENGINE.

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3H).
WHENEVER MAINTENANCE PROCEDURES ARE TO BE CARRIED OUT WITH ENGINE RUNNING, IT IS IMPERATIVE TO HAVE ENGINE COWLS CORRECTLY LATCHED, FOR SPEEDS RANGING ABOVE FLIGHT/GROUND IDLE.
MAINTENANCE PROCEDURES IN PROXIMITY TO AN ENGINE RUNNING AT GROUND IDLE SHALL BE REDUCED TO MINIMUM, AND ONLY WHEN APPROVED BY THE MAN IN CHARGE OF THE MANEUVER. IN THAT CASE, CHECK THAT FAN COWLS ARE CORRECTLY SECURED IN OPEN POSITION.

CAUTION : IF POSSIBLE THE AIRCRAFT SHOULD BE HEADED INTO WIND SO THAT EXHAUST GASES ARE NOT INGESTED BY THE ENGINES.
PRIOR TO STARTING ENGINE, CHECK THAT THRUST REVERSER LEVERS ARE IN STOWED POSITION AND THRUST REVERSERS, IF DEPLOYED, ARE FUNCTIONALLY CLEARED TO STOW.

CAUTION : IN SPECIAL CASES, IT IS NECESSARY TO RESTART THE ENGINE. BEFORE ACTIVATION OF STARTER, IT IS IMPERATIVE TO WAIT TILL N2 SPEED IS LESS THAN 30%.
IF THRUST REVERSERS ARE CYCLED DURING AN ENGINE CHECK OBSERVE THE FOLLOWING PRECAUTIONS :
DO NOT EXCEED 40 PERCENT N1.
DO NOT EXCEED RATE OF ONE REVERSER CYCLE PER 90 SECOND INTERVAL.
DO NOT EXCEED ONE MINUTE WITH REVERSER DEPLOYED.
RESTRICT REVERSER OPERATION TO FIVE CONSECUTIVE CYCLES FOLLOWED BY THIRTY MINUTES COOLING PERIOD.

NOTE : Special criteria/specification for use of a noise suppressor have to be defined on a case to case basis depending on the type of noise suppression system selected.
Operators interested in noise suppression systems can be assisted by the engine manufacturer.

1. Reasons for the Job

Type of Testing After Engine Component Replacement

(Ref. Fig. 501)

(Ref. 72-00-00, P. Block 501)

NOTE : In case of rectifying fuel or air leakage the referenced figure should be used as if the leaking component had been repaired or replaced. (Ref. Fig. 501).

A. Dry Motoring

B. Wet Motoring

C. Ground Running

D. Adjustment/Check

ITEM REMOVAL/INSTALLATION	DRY MOTORING	WET MOTORING	IDLE CHECK	VIBRATION CHECK * *	VSV TRACKING CHECK	POWER ASSURANCE CHECK	SEAL RUN-IN	PMC TEST 73-23-00, P. BLOCK 501
ENGINE ASSEMBLY/POWERPLANT			X	●	● +	●	●	
FUEL SYSTEM								
MAIN FUEL SUPPLY HOSE (71-00-00)		X						
FUEL PUMP (73-12-01)	X		X					
CARTRIDGE STRAINER ELEMENT (73-12-01)	X							
FUEL NOZZLE (73-13-01)			X					
N_1 SENSOR H/M (73-21-07)			X					
FUEL FILTER (73-12-03)	X							
MAIN ENGINE CONTROL (73-21-01)		X	X		*			
CIT SENSOR (73-21-02)	X		X					
PMC (73-23-00)								X
FAN INLET TEMP SENSOR (T_2)(73-23-07)			X					
FUEL PIPING DISCONNECTED		X	X					
FUEL PRESSURE TRANSMITTER (73-33-11)	X							
FUEL FLOW TRANSMITTER (73-31-11)		X	X					
FUEL FILTER DIFFERENTIAL PRESSURE SWITCH (73-34-11)	X							
LUBE SYSTEM								
OIL TANK (79-11-00)			X					
LUBE AND SCAVENGE PUMP (79-21-01)			X					
FUEL/OIL HEAT EXCHANGER (79-22-02)			X					
FILTERS			X					
OIL PIPING DISCONNECTED	X		X					
OIL TANK PRESSURIZING VALVE (79-11-00)			X					
OIL TEMPERATURE SENSOR (79-32-00)			X					
OIL QUANTITY TRANSMITTER (79-31-00)			X					
SUPPLY AND INLET SCAVENGE SCREENS (79-21-00)			X					
LOW OIL PRESSURE SWITCH (79-34-11)			X					
OIL PRESSURE TRANSMITTER (79-33-11)			X					
OIL FILTER DIFF PRESSURE SWITCH (79-35-11)			X					
MASTER CHIP DETECTOR HOUSING (79-22-03)			X					
AIR SYSTEM								
VSV FEEDBACK CABLE (75-31-01)			X					
VSV ACTUATOR (75-31-01)			X					
VBV FEEDBACK CABLE (75-32-04)			X					
VBV ACTUATOR (75-32-01)			X					
INDICATING SYSTEM								
FAN SPEED SENSOR (77-11-01)			X					
CONTROL ALTERNATOR (77-12-01)	X		X					
THERMOCOUPLE HARNESS (77-21-01)			X					
ACCESSORY DRIVE SYSTEM								
RADIAL DRIVESHAFT (72-62-00)			X					
TRANSFER GEARBOX (72-63-00)			X					
HORIZONTAL DRIVESHAFT (72-64-00)			X					
N_1 CONTROL ADAPTER (72-60-01)			X					
MOTORING PAD COVERPLATE (71-00-00)			X					

1025198-20-A

BM5 71 00 00 5 LAMA 13

Type of Testing After Engine Component Replacement
(Sheet 1/2)
Figure 501

R

R EFFECTIVITY: 001-100,

PIA

ITEM REMOVAL/INSTALLATION	DRY MOTORING	WET MOTORING	IDLE CHECK	VIBRATION CHECK * *	VSV TRACKING CHECK	POWER ASSURANCE CHECK	SEAL RUN-IN	PMC TEST 73-23-00, P. BLOCK 501
ENGINE START SYSTEM COMPONENTS								
PNEUMATIC STARTER (80-13-01) ***								
PNEUMATIC STARTER VALVE (80-13-02)	X							
PNEUMATIC STARTER AIR SUPPLY DUCT (80-13-08)	X							
STAGE 1 FAN ROTOR DISK AND STAGE 1 FAN STATOR VANE ASSEMBLY (72-21-00)			X	•		•		

NOTE:

* VSV TRACKING CHECK TO BE DONE NO LATER THAN THE NEXT LETTER CHECK, OR,

THE VSV TRACKING CHECK MAY BE IGNORED IF:

1. THE REPLACEMENT MEC IS A SERVICEABLE AND CERTIFIED UNIT FROM A MEC OVERHAUL/REPAIR FACILITY,
-AND-
2. THE INITIAL PROBLEM CAUSING THE MEC REPLACEMENT IS CORRECTED,
-AND-
3. MONITORING OF THE CRUISE TREND N2 SPEED FOR THE NEXT TEN (10) FLIGHT SECTORS INDICATES STABILITY WITHIN +/- 0.2% N2,
-AND-
4. CRUISE TRENDING N2 SPEED COMPARED TO N1 SPEED INDICATES NO SIGNIFICANT TREND SHIFT FOR THE NEXT TEN (10) FLIGHT SECTORS,
-AND-
5. TAKEOFF EGT MARGIN SHOWS NO SIGNIFICANT TREND SHIFT FOR THE NEXT TEN (10) FLIGHT SECTORS.

• POWER ASSURANCE, VSV TRACKING, SEAL RUN-IN AND VIBRATION CHECKS ARE NOT NECESSARY IF ENGINE HAS BEEN TESTED AND ACCEPTED IN AN APPROVED TEST CELL AFTER MAINTENANCE ACTION.

\+ VSV TRACKING CHECK IS NOT NECESSARY WHEN MODULAR MAINTENANCE IS DONE AND THE MEC AND THE VSV SYSTEM RIG IS NOT DISTURBED. ONLY THE MEC STATIC RIG IS REQUIRED.

** YOU MUST DO THESE TESTS FOR NEW PARTS, OR PARTS THAT DO NOT HAVE THE TEMPORARY IDENTIFYING MARK, OR WHEN THE BALANCE MAY HAVE CHANGED AS A RESULT OF MAINTENANCE ACTIONS TAKEN.

*** OPERATE ENGINE AT 80% N2 FOR 2-3 MINUTES AND CHECK STARTER FOR OIL LEAKS. NO LEAKAGE IS PERMITTED.

1099481-04-A

BM5 71 00 00 5 LAMJ 04

Type of Testing After Engine Component Replacement
(Sheet 2/2)
Figure 501

2. Equipment and Materials

	ITEM	DESIGNATION
	A.	Warning Notice
	B.	Circuit Breaker Safety Clips
	C.	Access Platform 2 m (6 ft. 7 in.)
	D.	Torque Wrench
	E.	Thermometer
	F. Material No.C02-023	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
	G. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
	H. 2C6395	Hydraulic Actuator
R	J. 2C14232	Kit - VSV Read out
R	K. 2C6451	Set, Transmitter VSV Position
	Referenced Procedures	
	- 12-13-24, P. Block 1	Replenishing-Electrical Power
	- 12-13-79, P. Block 1	Engine Lubricating Oil
	- 12-13-80, P. Block 1	Replenishing-Starting System
	- 24-41-00, P. Block 301	AC External Power Control
	- 26-21-00, P. Block 501	Engine Fire Extinguishing
	- 26-21-15, P. Block 401	Fire Extinguisher Bottle
	- 29-10-00, P. Block 301	Main Hydraulic Power
	- 49-00-00, P. Block 501	Airborne Auxiliary Power
	- 71-00-00, P. Block 501	Power Plant - General
	- 71-13-00, P. Block 301	Cowl Doors
	- 72-00-00, P. Block 501	Engine
	- 72-00-00, P. Block 601	Engine
R	- 73-13-01, P. Block 401	Fuel Nozzles
	- 73-21-01, P. Block 501	Main Engine Control (MEC)
	- 75-32-01, P. Block 501	Variable Bypass Valve Actuator
	- 77-31-08, P. Block 401	Variable Stator Vane Position Transducer
	- 77-31-08, P. Block 501	Variable Stator Vane Position Transducer

3. Safety and Operating Precautions

WARNING : BEFORE YOU OPERATE THE ENGINES AT POWER SETTINGS ABOVE IDLE, MAKE SURE THAT ACCESS DOOR 136AR IS OPEN. THIS IS TO MAKE SURE THAT THERE IS NO RISK OF RESIDUAL PRESSURE IN THE AIRCRAFT AFTER ENGINE SHUTDOWN.
IF PERSONNEL TRIES TO OPEN A DOOR WHEN THERE IS RESIDUAL PRESSURE IN THE AIRCRAFT :
- THE DOOR CAN OPEN WITH DANGEROUS SUDDEN FORCE AND
- THERE IS A RISK OF DEATH OR BAD INJURY AND DAMAGE TO THE AIRCRAFT.

A. Cowls
When cowls are opened for maintenance purposes, cowl hold open rods must be extended and secured to engine before proceeding with maintenance procedures.

WARNING : ENGINE RUN-UP WITH FAN REVERSER COWLS AND CORE COWLS OPEN IS PROHIBITED AT HIGHER THAN MAXIMUM MOTORING (APPROX. 20% N2). ENGINE RUN-UP WITH FAN COWL OPEN AND SECURED BY HOLD-OPEN RODS IS PROHIBITED AT POWER HIGHER THAN MINIMUM IDLE.

WARNING : PERSONNEL SHALL AVOID STANDING OR EXPOSING THEIR EXTREMITIES BETWEEN COWLS WHEN OPENING AND CLOSING UNLESS COWLS ARE PROPERLY SUPPORTED.

CAUTION : DO NOT OPERATE FAN REVERSER HALVES IF GROUND WIND VELOCITIES EXCEED 30 KNOTS. COWLS DOORS AND REVERSER HALVES IN OPEN POSITION SUPPORTED BY HOLD-OPEN RODS WILL SAFETY WITHSTAND GROUND WINDS UP TO 52KNOTS. IN CASE OF HEAVY GUSTS IT IS SUGGESTED TO LIMIT OPENING OF FAN COWLS TO THE 40° POSITION.

B. Application of External Power and Pressure

WARNING : BEFORE ACTIVATING ANY FUEL, ELECTRICAL, HYDRAULIC OR PNEUMATIC SYSTEM FOR MAINTENANCE PURPOSES, MAKE CERTAIN THAT ALL PERSONNEL AND EQUIPMENT ARE CLEAR OF SYSTEM TO BE ACTIVATED, INADVERTENT OPERATION OF AN AIRCRAFT SYSTEM COULD RESULT IN DEATH OR SERIOUS INJURY TO PERSONNEL.

C. Spilled Fluids

(1)Clean up spilled fluids immediately to prevent damage to and contamination of engine components, accessories, and compartments.

WARNING : A MINIMUM OF 5 MINUTES SHOULD ELAPSE AFTER ENGINE SHUTDOWN BEFORE REMOVING OIL TANK FILLER CAP TO ALLOW TANK PRESSURE TO BLEED OFF. HOT OIL GUSHING FROM TANK COULD CAUSE SEVERE BURNS.

D. Engine Motoring

CAUTION : FUEL PUMP AND MAIN ENGINE CONTROL ARE FUEL-LUBRICATED. DO NOT MOTOR ENGINE UNLESS A POSITIVE FUEL INLET PRESSURE IS INDICATED.

CAUTION : ENGINE DRIVEN HYDRAULIC PUMPS ARE HYDRAULIC FLUID LUBRICATED. DO NOT MOTOR, START, OR OPERATE ENGINE UNLESS HYDRAULIC TANK PRESSURIZATION VALUE IS WITHIN NORMAL OPERATING RANGE.

E. Manually Operating Starter Shutoff Valve

WARNING : WHEN MANUALLY OPERATING AN ENGINE STARTER SHUTOFF VALVE, HAND AND ARM COVERAGE MUST BE WORN. HEAT FROM AIR EXHAUSTING FROM STARTER COULD RESULT IN INJURY TO PERSONNEL.

WARNING : OBSERVE DANGER AREAS (REF. PARA. G.).

In case of faulty starter valve electrical circuit, the valve can be operated by use of a manual override handle which is an integral of the starter valve.

Procedures related with manual starter valve operation in flight compartment will be identical to normal starting with the following exceptions :

(1)Establish communication between flight compartment and ground personnel at engine.

(2)When ready for start, advise ground personnel to open starter valve. Open valve as follows :

R - Open access door 451BL (461BL).
R - Insert a square drive wrench in the socket in the end of the butterfly
R shaft through the guided hole at the bottom side of F/R.
R - Visually check the alignment of the T-wrench to the starter valve
R from 451BL (461BL).
R - Close the access panel 451BL (461BL).
R - Rotate the shaft counterclockwise.
R - Hold the valve open until the engine reaches a self sustaining speed.
R - After engine reaches a self sustaining speed, close valve by rotating
R the shaft clockwise.
R - Remove square drive wrench from the start valve.

F. Ground

(1)Operation in Icing Conditions

Operation at ground Idle in icing conditions is permissible up to periods of one hour without special engine acceleration or operating procedures. If ground operation at minimum idle in icing conditions exceeds one hour, the engine should be accelerated to an N1 of 57 percent at intervals of one hour for a period of not more than 30 seconds.

(2)Ground run operation.

CAUTION : MAKE SURE THE A/C IS PARKED ON A CLEAN DRY FLAT AREA. THERE SHOULD BE NO OIL, GREASE, OR OTHER SLIPPERY MATERIAL ON THAT SURFACE. FOR ENGINE HIGH POWER GROUND RUNS, PAVEMENT MUST BE IN CONCRETE BECAUSE ASPHALT CAN CAUSE DAMAGE TO THE REAR STRUCTURE OF THE A/C AND/OR THE ENGINE NACELLES.

NOTE : Idle runs are allowed on asphalt provided it is in good condition.

G. Engine Danger Zones : (Ref. Fig. 502, 503, 504)
(Ref. Fig. 505, 506)
(Ref. Fig. 507, 508)

WARNING : ALL SAFETY PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION. SUCTION AT THE AIR INLET IS SUFFICIENT TO KILL OR SERIOUSLY INJURE PERSONNEL BY DRAWING THEM SUDDENLY INTO OR AGAINST THE AIR INTAKE. THE HIGH TEMPERATURE, VELOCITY AND OVERPRESSURE (ABOVE ATMOSPHERIC) WITHIN THE EXHAUST GAS WAKE IS ALSO EXTREMELY DANGEROUS.

Routine safety precautions that must be observed while operating the engine are listed below :

(1)Make certain that personnel are standing clear of the exhaust area.
(2)Make certain that personnel are standing clear of the engine inlet.
(3)Make certain that fuel drainage does not present a fire hazard.
(4)Make certain that the ground beneath the engine is clean and free of loose debris which might possibly be picked up and ingested by the engine.

H. When operating one engine at N1 > 80% the following procedure must be applied :

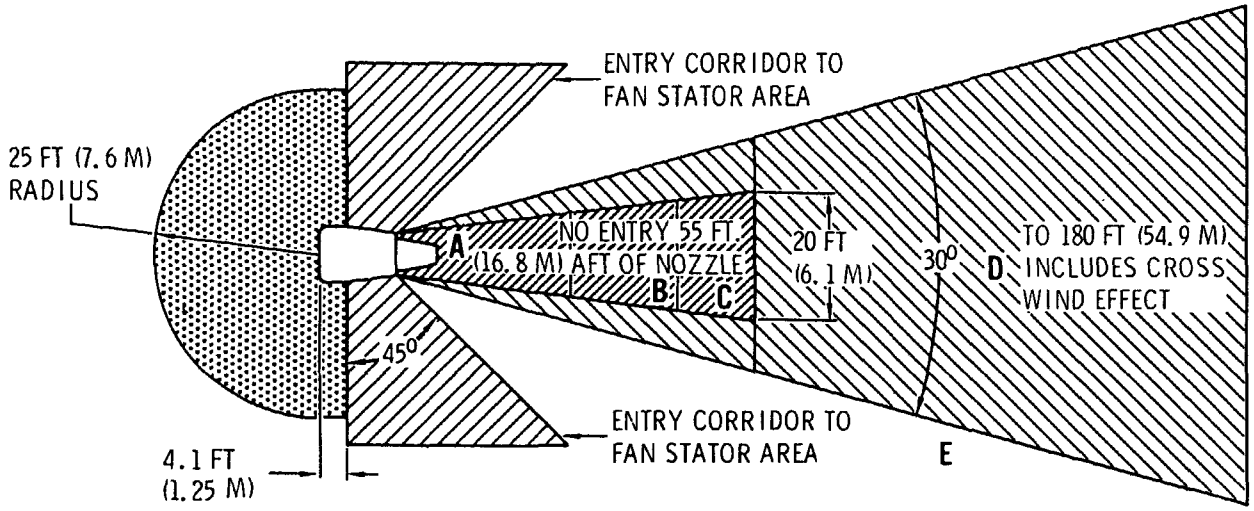
WARNING : DO NOT PULL CIRCUIT BREAKERS 1GB, 2GB, 3GB, 83GB, AND 119GB OTHERWISE AIRCRAFT BRAKING THROUGH BRAKE PEDALS IS INOPERATIVE.

WARNING : DO NOT ALLOW ONE ENGINE TO RUN AT N1 > 80% WITH AIRCRAFT IMMOBILIZED BY MEANS OF WHEEL CHOCKS AND PARKING BRAKE (WHEEL CHOCKS AND BRAKE PEDALS MUST BE USED).

(1)Check that fuel quantity contained in inner tanks is at least equal to 8000 kg (17,700 lb.).
(2)Maintain aircraft immobilized as follows :
(a)Make sure that wheel chocks 98F10103500000 are in position in front of each forward main landing gear (MLG) wheel.
(b)There must be two qualified persons in the cockpit when performing an engine run above idle. One must monitor the outside and the aircraft behaviour while the other performs the engine test.
(c)If the aircraft begins to move while performing an engine run, immediately set all the thrust levers to idle position.
(d)Make certain that the Green Hydraulic System is pressurized (Ref. 29-10-00, P. Block 301).
(e)On panel 401VU, make certain that BRK A/SKID selector switch (96 GG) is in NORM ON position.
(f)Fully depress and hold brake pedals.
(g)Release parking brake handle.
On panel 4VU on triple indicator 71GG, make certain that brake pressure decreases to zero.
(h)In brake unit area, do a visual check of the brake pistons of the normal system to make sure they are in the extended position. This confirms the brake proper operation.
(j)Perform engine ground run.

WARNING : IN ORDER TO REDUCE AIRFRAME LATERAL LOAD, NEVER ALLOW AN ENGINE TO RUN AT N1 > 80% RATING WITHOUT THE OTHER ENGINE BEING AT A RATING OF N1 = 65%.

(3)Return to parking brake applied configuration :
(a)Pull parking brake handle.
(b)Release brake pedals.
(c)On panel 4VU on triple indicator, check that brake pressure increases to 2109 psi (145 bars).



EXHAUST WAKE DANGER AREA 65 MPH (105 Km/h) OR GREATER

INLET SUCTION DANGER AREA

EXHAUST WAKE DANGER AREA 65 MPH (105 Km/h) OR LESS

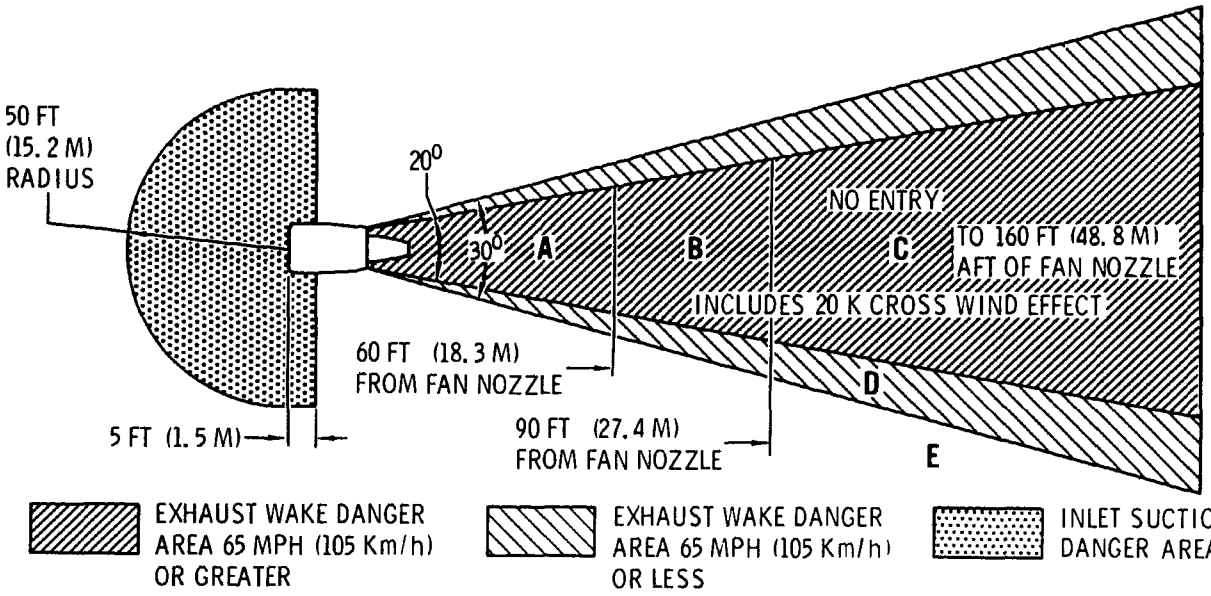
ENTRY CORRIDOR

AREA	APPROX. WIND VELOCITY MPH (Km/h)	POSSIBLE EFFECTS WITHIN DANGER ZONE BASED ON "RADIOLOGICAL DEFENSE" VOL II ARMED FORCES SPECIAL WEAPONS PROJECT, NOV. 1951
A	210-145 (338-233)	A MAN STANDING FACE-ON WILL BE PICKED UP AND THROWN: AIRCRAFT WILL BE COMPLETELY DESTROYED OR DAMAGED BEYOND ECONOMICAL REPAIR; COMPLETE DESTRUCTION OF FRAME OR BRICK HOMES.
B	145-105 (233-169)	A MAN STANDING FACE-ON WILL BE PICKED UP AND THROWN; DAMAGE NEARING TOTAL DESTRUCTION TO LIGHT INDUSTRIAL BUILDINGS OR RIGID STEEL FRAMING; CORRUGATED STEEL STRUCTURES LESS SEVERELY DAMAGED.
C	105-65 (169-105)	MODERATE DAMAGE TO LIGHT INDUSTRIAL BUILDINGS AND TRANSPORT TYPE AIRCRAFT.
D	65-20 (105-32)	LIGHT TO MODERATE DAMAGE TO TRANSPORT TYPE AIRCRAFT.
E	20 (32)	BEYOND DANGER AREA.

BM5 71 00 00 5 LCM0 01

CF8-6143-02-A

Inlet and Exhaust Danger Zones - Minimum Idle
Figure 502

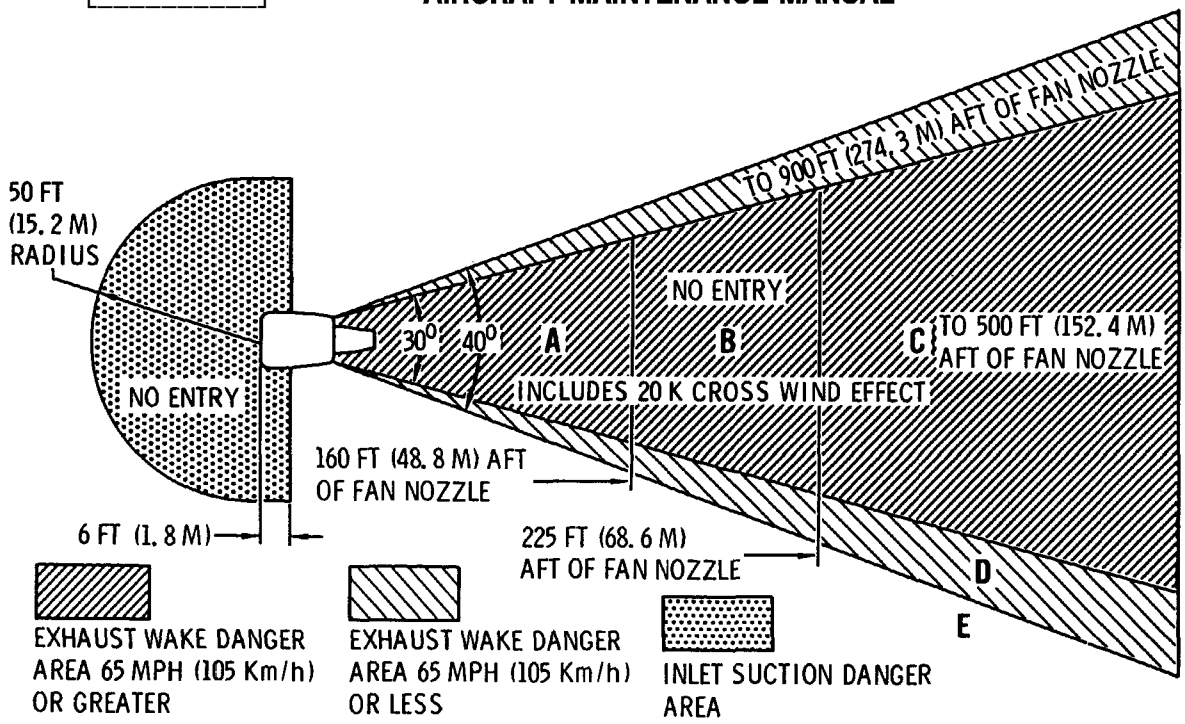


AREA	APPROX. WIND VELOCITY MPH (Km/h)	POSSIBLE EFFECTS WITHIN DANGER ZONE BASED ON "RADIOLOGICAL DEFENSE" VOL. II ARMED FORCES SPECIAL WEAPONS PROJECT, NOV. 1951
A	210-145 (338-233)	A MAN STANDING WILL BE PICKED UP AND THROWN: AIRCRAFT WILL BE COMPLETELY DESTROYED OR DAMAGED BEYOND ECONOMICAL REPAIR: COMPLETE DESTRUCTION OF FRAME OR BRICK HOMES.
B	145-105 (233-169)	A MAN STANDING FACE-ON WILL BE PICKED UP AND THROWN: DAMAGE NEARING TOTAL DESTRUCTION TO LIGHT INDUSTRIAL BUILDINGS OR RIGID STEEL FRAMING. CORRUGATED STEEL STRUCTURES LESS SEVERELY DAMAGED.
C	105-65 (169-105)	MODERATE DAMAGE TO LIGHT INDUSTRIAL BUILDINGS AND TRANSPORT TYPE AIRCRAFT.
D	65-20 (105-32)	LIGHT TO MODERATE DAMAGE TO TRANSPORT-TYPE AIRCRAFT.
E	20 (32)	BEYOND DAMAGE AREA.

CF8-6145-00-A

BM5 71 00 00 5 LEM0 01

Inlet and Exhaust Danger Zones - Breakaway Thrust
Figure 503

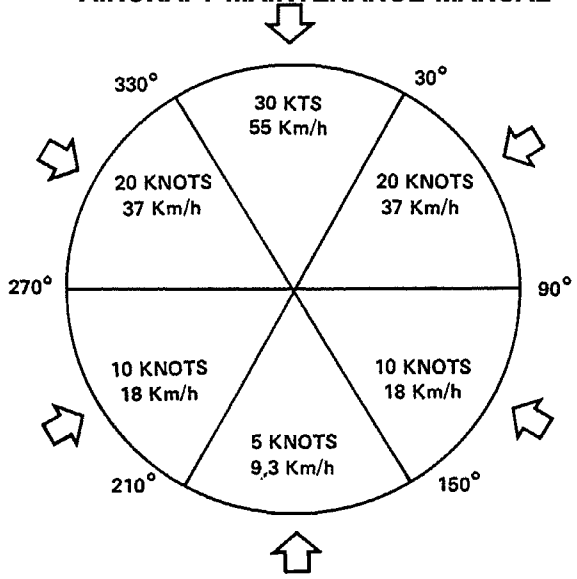


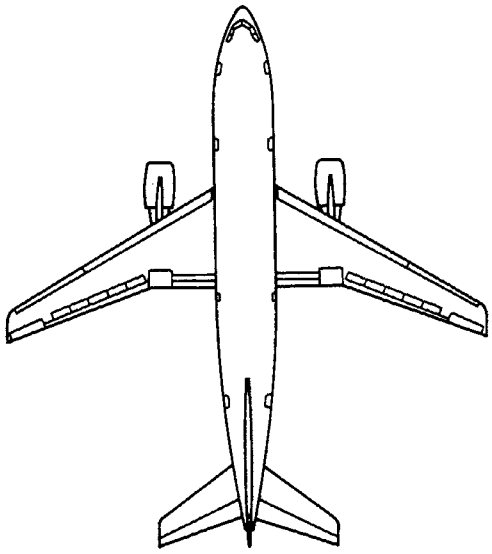
AREA	APPROX. WIND VELOCITY MPH (Km/h)	POSSIBLE EFFECTS WITHIN DANGER ZONE BASED ON "RADIOLOGICAL DEFENSE" VOL II ARMED FORCES SPECIAL WEAPONS PROJECT, NOV. 1951
A	210-145 (338-233)	A MAN STANDING WILL BE PICKED UP AND THROWN; AIRCRAFT WILL BE COMPLETELY DESTROYED OR DAMAGED BEYOND ECONOMICAL REPAIR; COMPLETE DESTRUCTION OF FRAME OR BRICK HOMES.
B	145-105 (233-169)	A MAN STANDING FACE-ON WILL BE PICKED UP AND THROWN; DAMAGE NEARING TOTAL DESTRUCTION TO LIGHT INDUSTRIAL BUILDINGS OR RIGID STEEL FRAMING; CORRUGATED STEEL STRUCTURES LESS SEVERELY
C	105-65 (169-105)	MODERATE DAMAGE TO LIGHT INDUSTRIAL BUILDINGS AND TRANSPORT TYPE AIRCRAFT.
D	65-20 (105-32)	LIGHT TO MODERATE DAMAGE TO TRANSPORT TYPE AIRCRAFT.
E	20 (32)	BEYOND DANGER AREA.

CF8-6144-00-A

BM5 71 00 00 5 LGM0 01

Inlet and Exhaust Danger Zones - Takeoff Thrust
Figure 504





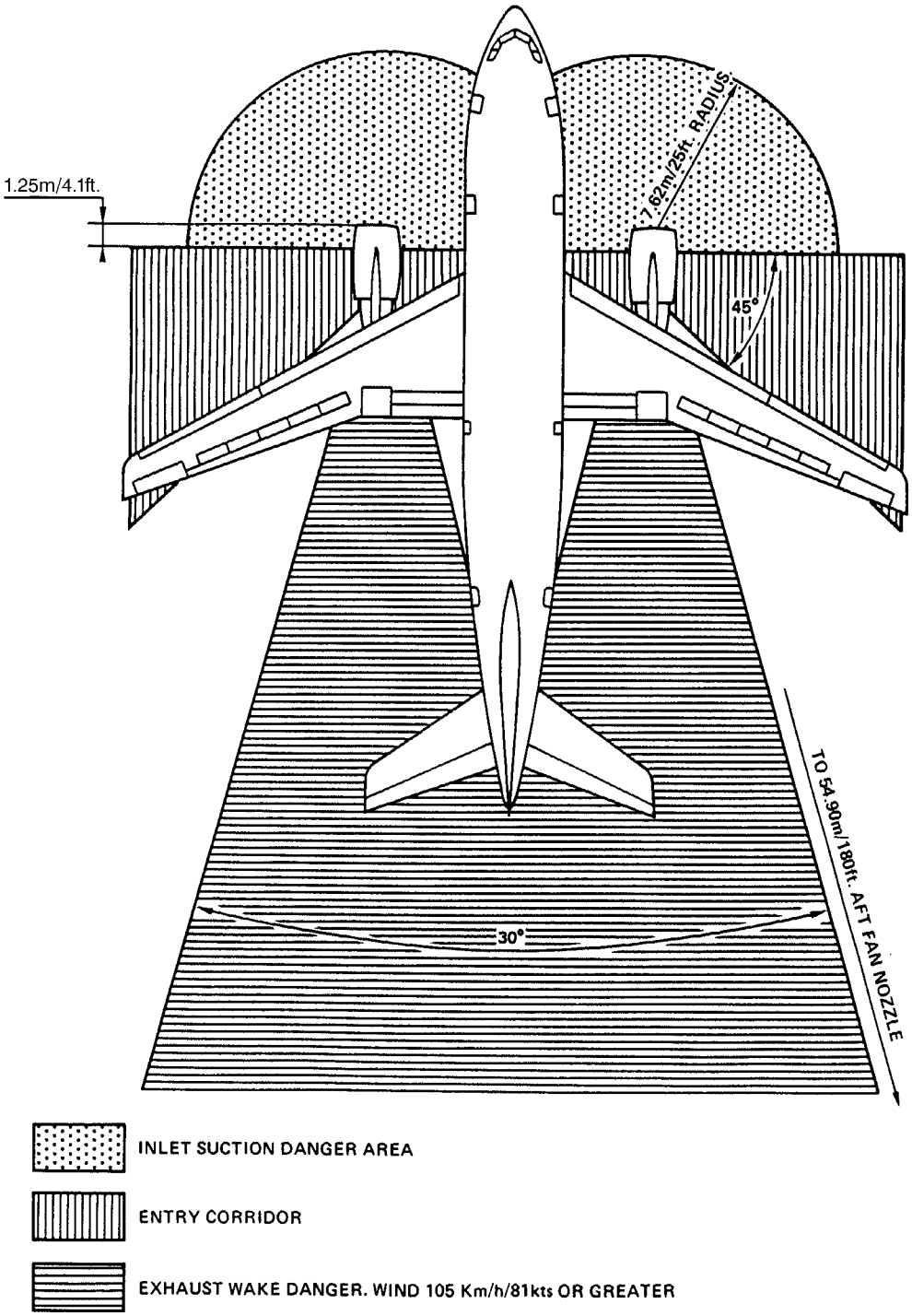
1 - ⇨ - RELATIVE WIND DIRECTION

2 - ENGINE OPERATION SHOULD NOT BE ATTEMPTED AT THRUST LEVEL ABOVE PART POWER WHEN WIND DIRECTION AND VELOCITY EXCEEDS VALUES AS SHOWN.

3 - REDUCE MAXIMUM LIMIT 9 Km/h/ 5 KNOTS FOR GUSTY WIND CONDITIONS

BM5 71 00 00 5 LBNO - 01

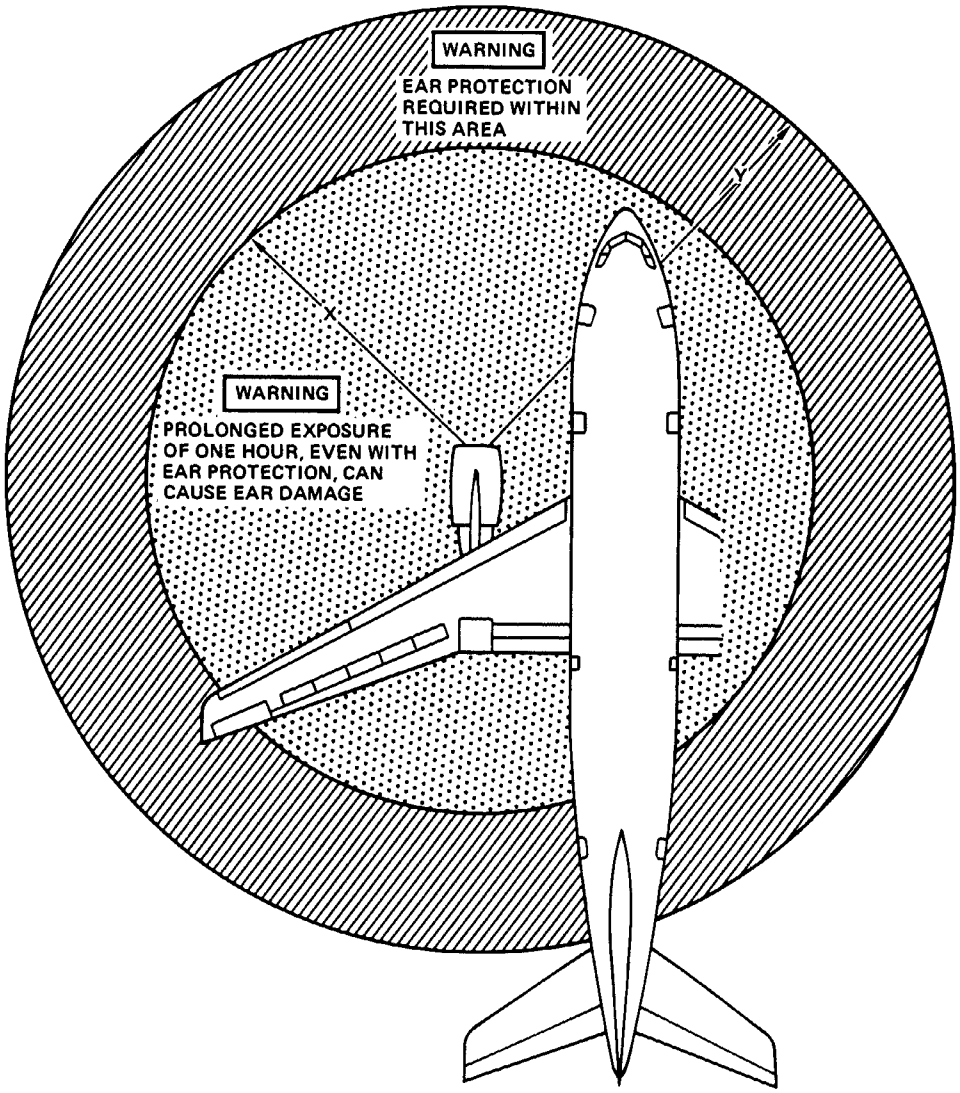
Engine Run-Up-Preferred Wind Direction
Figure 505



BM5 71 00 00 5 LDN0 01

Danger Areas - Engine Idle Power
Figure 506

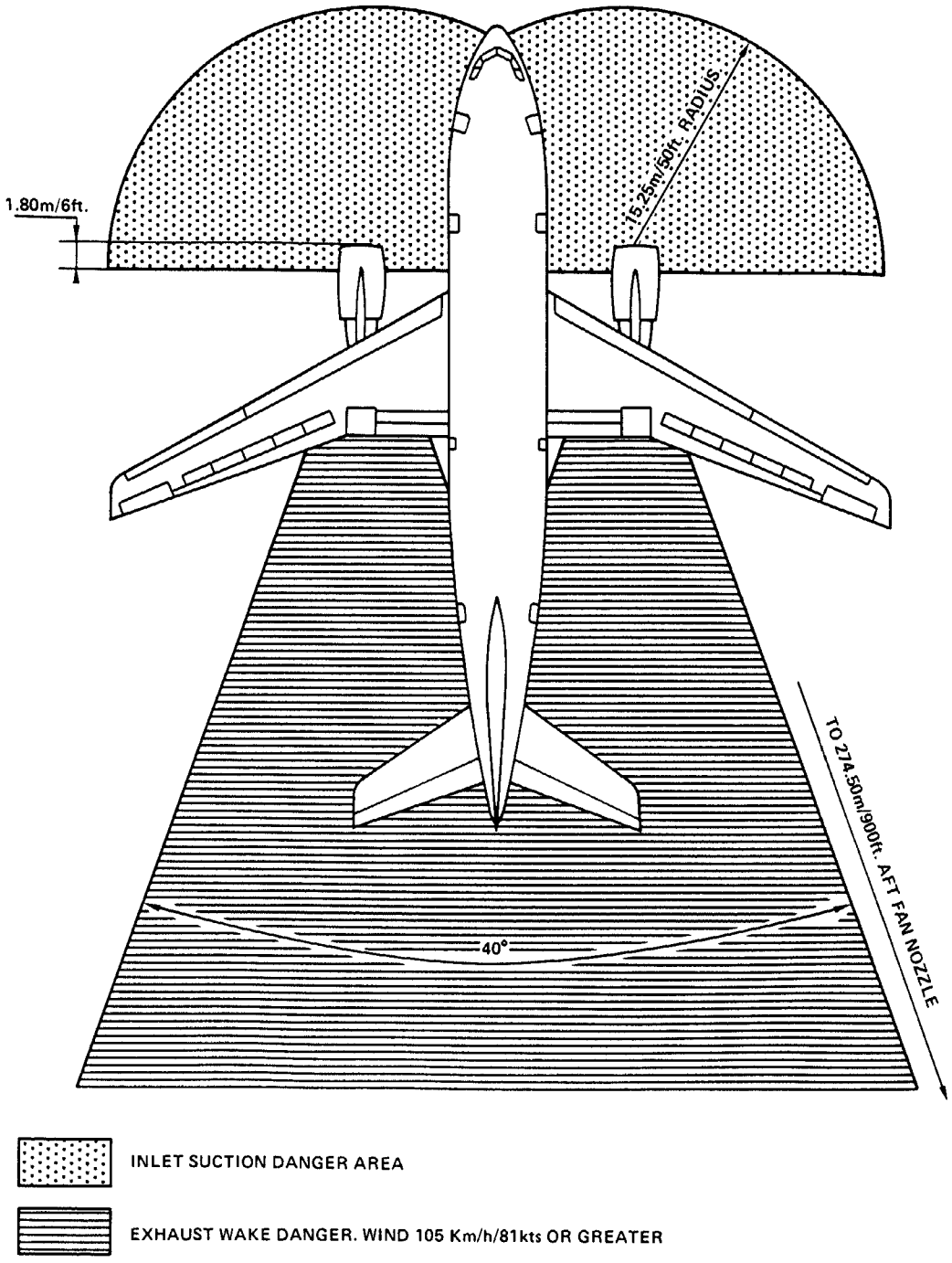
R



CONFIGURATION	RADIUS : X	RADIUS : Y
GROUND IDLE	22.90m/75ft.	30.50m/100ft.
BREAK AWAY THRUST N1 - 1800RPM	30.50m/100ft.	45.75m/150ft.
TAKE OFF THRUST	30.50m/100ft.	61m/200ft.

BM5 71 00 00 5 LFNO - 15 - 10
DM5

Engine Noise Danger Areas
Figure 507



BM5 71 00 00 5 LHNO - 15 - 10
DM5

Danger Areas - Engine Take-off Power
Figure 508

4. Operating Limits (Ref. Fig. 509)

CAUTION : DO NOT ALLOW START TEMPERATURE TO EXCEED 750°C (1382°F) FOR MORE THAN 40 SECONDS ; TERMINATE START ATTEMPT.

A. Exhaust Gas Temperature (EGT)
Write down all the engine overtemperatures. Refer to 72-00-00, P. Block 601 for maintenance steps after overtemperature condition.

ITEM	LIMITS	REMARKS
(1)Starting	750°C (1382°F)	If start temperature is 750°C - 870°C (1382 - 1598°F) the start/run cycle may be completed but record temperature and refer to inspection/check. If above 870°C (1598°F), engine must be removed.
(2)All other operations (Ref. Fig. 509)		

B. Speed RPM (Ref. Fig. 510, 511)
If the fan (N1) or core (N2) speed limits are exceeded, the amount and duration of overspeed must be recorded.

ITEM	LIMITS	REMARKS
(1)Fan (N1)	117.5%	Refer to 72-00-00, P. Block 601 for Overspeed Inspection
(2)Core (N2)	112.5%	Refer to 72-00-00, P. Block 601 for Overspeed Inspection

C. Oil System
(1)Oil pressure (Ref. Fig. 512)
NOTE : With the oil scavenge temperature in correct range (65° - 160°C/149 - 320°F) oil pressure can change between 20-30 psid (1.40 - 2.07 Bars) at minimum idle and 30-80 psid (2.07 - 5.52 Bars) at takeoff. The Oil pressure is non-adjustable.
Oil pressures below 10 psid (0.7 Bar) are unsafe and require that the engine be shutdown. The malfunctioning cause must be investigated and corrected.
Positive oil indication must be obtained before ground idle, if not shut down engine.
During starts in sub-zero weather the oil pressure gage may "peg-out" in excess of 160 psid (11.04 Bars) due to high oil viscosity caused by low temperatures. There is no specific minimum oil temperature requirement in cold weather, however oil temperature indications should be noted prior to takeoff.
Oil pressures should subside as oil temperatures increases. If oil pressure remains above normal after temperature stabilizes

OPERATING CONDITION	MAX EGT		MAX N_1 RPM (%)	MAX N_2 RPM (%)	OIL PRESSURE	OIL TEMP °C (°F)	OIL QUANTITY UNITS
	TIME LIMIT	°C (°F)					
STARTING	UNLIMITED	750 (1382)	3854 (117.5)	11055 (112.5)	10 PSID MIN (0.69 BARS)	65-160 (149-320)	———
TAKEOFF	5 MINUTES	960 (1760)	3854 (117.5)	11055 (112.5)	10 PSID MIN (0.69 BARS)	65-160 (149-320)	20 MAX
MAX CONT.	UNLIMITED	925 (1697)	3854 (117.5)	11055 (112.5)	10 PSID MIN (0.69 BARS)	65-160 (149-320)	20 MAX

EGT/TIME LIMITS

STARTING CAUTION:

—IF THE EGT LIMIT OF 750°C (1382°F) IS EXCEEDED, MAINTENANCE ACTION MUST BE TAKEN PER OVER TEMPERATURE INSPECTION REQUIREMENT IN THE INSPECTION SECTION.

—IF ABOVE 870°C (1598°C). THE ENGINE MUST BE REMOVED.

TAKEOFF: TAKEOFF POWER DURATION IS LIMITED TO 5 MINUTES. REFER TO INSPECTION SECTION FOR APPROPRIATE MAINTENANCE ACTION IF TAKEOFF POWER LIMITS ARE EXCEEDED.

OIL PRESSURE/TEMPERATURE LIMITS

STARTING CAUTION:

OIL PRESSURES BELOW 10 PSID (0.69 BARS) REQUIRES ENGINE SHUTDOWN AND THE CAUSE INVESTIGATED.

—FULL-SCALE PRESSURE SURGES MAY OCCUR DURING COLD SOAK, SUB ZERO TEMPERATURE STARTS. (COLD-START BYPASS VALVE OPENS AT 300 PSI (20.7 BARS).

—UNDER VERY COLD CONDITIONS, WITH BOTH OIL AND FUEL AT LOW TEMPERATURE, THE OIL PRESSURE COULD GO ABOVE 80 PSID (5.52 BARS) AT RATED CORE ENGINE SPEED, UNDER THESE CONDITIONS THE HIGH OIL PRESSURE IS PERMITTED AND TAKE OFF IS PERMITTED WITHOUT A WARM-UP PERIOD.

TAKEOFF: OIL PRESSURES CAN CHANGE BETWEEN 30-80 PSID (2.07-5.52 BARS) DURING NORMAL OPERATION.

—TRANSIENT TEMPERATURES ABOVE 160°C (320°F) UP TO 175°C (347°F) MAXIMUN ARE LIMITED TO 15 MINUTES.

HIGH OIL QUANTITY: TROUBLESHOOTING AND CORRECTION FOR CAUSE OF HIGH OIL QUANTITY MUST BE DONE BEFORE THE NEXT ENGINE START (REF 79-00-00, P. BLOCK 101)

1025857-04-A

BM5 71 00 00 5 LLM0 06

Engine Operating Limits
Figure 509

%	RPM	%	RPM	%	RPM	%	RPM
1	32.8	31	1016.8	61	2000.8	91	2984.8
2	65.6	32	1049.6	62	2033.6	92	3017.6
3	98.4	33	1082.4	63	2066.4	93	3050.4
4	131.2	34	1115.2	64	2099.2	94	3083.2
5	164.0	35	1148.0	65	2132.0	95	3116.0
6	196.8	36	1180.8	66	2164.8	96	3148.8
7	229.6	37	1213.6	67	2197.6	97	3181.6
8	262.4	38	1246.4	68	2230.4	98	3214.4
9	295.2	39	1279.2	69	2263.2	99	3247.2
10	328.0	40	1312.0	70	2296.0	100	3280.0
11	360.8	41	1344.8	71	2328.8	101	3312.8
12	393.6	42	1377.6	72	2361.6	102	3345.6
13	426.4	43	1410.4	73	2394.4	103	3378.4
14	459.2	44	1443.2	74	2427.2	104	3411.2
15	492.0	45	1476.0	75	2460.0	105	3444.0
16	524.8	46	1508.8	76	2492.8	106	3476.8
17	557.6	47	1541.6	77	2525.6	107	3509.6
18	590.4	48	1574.4	78	2558.4	108	3542.4
19	623.2	49	1607.2	79	2591.2	109	3575.2
20	656.0	50	1640.0	80	2624.0	110	3608.0
21	688.8	51	1672.8	81	2656.8	111	3640.8
22	721.6	52	1705.6	82	2689.6	112	3673.6
23	754.4	53	1738.4	83	2722.4	113	3706.4
24	787.2	54	1771.2	84	2755.2	114	3739.2
25	820.0	55	1804.0	85	2788.0	115	3772.0
26	852.8	56	1836.8	86	2820.8	116	3804.8
27	885.6	57	1869.6	87	2853.6	117	3837.6
28	918.4	58	1902.4	88	2886.4	118	3870.4
29	951.2	59	1935.2	89	2919.2	119	3903.2
30	984.0	60	1968.0	90	2952.0	120	3936.0

CF8-C3396-00-A

BM5 71 00 00 5 LNMO -15 - 10
DM5

Fan Speed - Percent vs RPM
Figure 510

CORE ENGINE SPEED (N_2) - PERCENT VS RPM

%	RPM	%	RPM	%	RPM	%	RPM
1	98.3	31	3046.4	61	5994.4	91	8942.6
2	196.5	32	3144.6	62	6092.7	92	9040.8
3	294.8	33	3242.9	63	6191.0	93	9139.1
4	393.1	34	3341.2	64	6289.3	94	9237.4
5	491.3	35	3439.4	65	6387.6	95	9335.6
6	589.6	36	3537.7	66	6485.8	96	9433.9
7	687.9	37	3636.0	67	6584.1	97	9532.2
8	786.2	38	3734.3	68	6682.4	98	9630.4
9	884.4	39	3832.5	69	6780.6	99	9728.7
10	982.7	40	3930.8	70	6878.9	100	9827.0
11	1081.0	41	4029.1	71	6977.2	101	9925.3
12	1179.2	42	4127.3	72	7075.4	102	10023.5
13	1277.5	43	4225.6	73	7173.7	103	10121.8
14	1375.8	44	4323.9	74	7272.0	104	10220.1
15	1474.0	45	4422.1	75	7370.2	105	10318.4
16	1572.3	46	4520.4	76	7468.5	106	10416.6
17	1670.6	47	4618.7	77	7566.8	107	10514.9
18	1768.9	48	4717.0	78	7665.1	108	10613.2
19	1867.1	49	4815.2	79	7763.3	109	10711.4
20	1965.4	50	4913.5	80	7861.6	110	10809.7
21	2063.7	51	5011.8	81	7959.9	111	10908.0
22	2161.9	52	5110.0	82	8058.1	112	11006.2
23	2260.2	53	5208.3	83	8156.4	113	11104.5
24	2358.4	54	5306.6	84	8254.7	114	11202.8
25	2456.7	55	5404.8	85	8353.0	115	11301.1
26	2555.0	56	5503.1	86	8451.2	116	11399.3
27	2653.3	57	5601.4	87	8549.5	117	11497.6
28	2751.6	58	5699.7	88	8647.8	118	11595.9
29	2849.8	59	5797.9	89	8746.0	119	11694.1
30	2948.1	60	5896.2	90	8844.3	120	11792.4

CF8-3911-00-A

BM5 71 00 00 5 LPMO - 14 - 10
DM5

Core Engine Speed - Percent vs RPM
Figure 511

within limits ; shut down engine, investigate and rectify cause. During steady state operation, any change of 10 psid (0.7 bar), is cause for investigation.

ITEM	LIMITS	REMARKS
(a)Starting		Positive oil pressure indication must be noted as engine acceleration increases during start. Subzero temperatures or cold soak conditions may result in transient oil pressure surges causing instrument scale deflection up to 160 psid (11.04 bars).
(b)Idle	10 psid (0.70 bar) minimum	Normal pressure varies between 15-30 psid (1.05 - 2.07 bars).
(c)Cruise/Takeoff		Normal pressure varies between 30-80 psid (2.07 - 5.52 bars).

(2)Limits for oil quantity

(a)With the engine in operation, normal oil quantity is 21 quarts (20 liters) or less.

1 If the oil quantity is more than 21 quarts (20 liters), with the engine in operation at a stable speed (N2 > 60 %) then do the trouble shooting procedure for high oil quantity (Ref. 79-00-00).

(3)Scavenge Oil Temperature

(a)Transient Operation	175°C (347°F)	Do not exceed 160°C (320°F) for more than 15 minutes.
(b)Steady State Operation	160°C (320°F)	Normal range is 65-160°C (149-320°F)

ITEM	MAXIMUM GUIDELINE	REMARKS
(4)Oil Consumption	0.55 US. Quarts/Hour (0.52l/h)	Normal consumption is approximately 0.25 US Quarts/hour (0.24l/h). If oil consumption exceeds maximum guideline investigate cause and schedule corrective action as indicated.
		R If cause of oil consumption is from R the low oil pressure and/or the oil R pressure transmitter tube, perform R inspection of the control alternator R adapter package (Ref. 72-65-00, R P. Block 601).

NOTE : Operation with an oil consumption rate more than the maximum guideline of 0.55 US Quarts/hour (0.52 l/h) is permitted if the consumption rate will result in a sufficient oil supply for the scheduled routing. To find the maximum allowable consumption rate you must include the maximum flight duration, possible go-around, and the maximum possible engine gulping of 12 quarts (11 liters).

You must not allow the indicated oil quantity to fall below zero quarts during the planned flights.
Gearbox lube oil leakage shall not exceed 5cc per hour per pad.
No sump overboard drain leakage is allowed.

D. Starting and Ignition Systems

ITEM	LIMITS	REMARKS
(1)Starter	5 minutes	Starter may be subjected to any number of start cycles of 5 minute duration. A minimum of a 2 minute cooling period is required after the first 5 minute cycle, and a 10 minute cooling period after subsequent 5 minute start cycles.
(2)Ignition System	Unlimited	

NOTE : When repeating starting operations, select START A and START B alternately. Alternate use of the starting circuits will prolong the life of components.

E. Ground Operation in Icing Conditions

ITEM	LIMITS	REMARKS
		Operation at Minimum Idle in icing conditions is permissable up to periods of one hour without special engine acceleration or operating procedures. If ground operation at Minimum Idle in icing conditions exceeds one hour, the engine should be accelerated to an N1 of 57 percent at intervals of one hour for a period of not more than 30 seconds.

F. Fuel System

ITEM	LIMITS	REMARKS
(1)Primary fuels	Unlimited	

NOTE : Fuels conforming to commercial Jet Fuel Specification ASTM D 1655, ASTM ES2-74, Jet A, Jet A1, or Jet B are authorized for unlimited use in engine : (Refer to G.E. Spec. D50TF2 and revisions).

(2)Alternate fuels	Unlimited	

NOTE : Fuels conforming to MIL-T-5624K grades JP-4, JP-5 or MIL-T-83133, grade JP-8 are acceptable alternates. The engine will

ITEM	LIMITS	REMARKS

operate satisfactorily with all or any mixture of the listed fuels. No specific gravity adjustment is required when changing from primary to alternate fuels.

(3)Emergency fuels — Limited

CAUTION : USE OF AVIATION GASOLINE IS RESTRICTED TO MAXIMUM OF 3 HOURS CONTINUOUS OPERATION ; MAX. CUMULATIVE OF 10 HOURS BETWEEN HOT SECTION INSPECTIONS. ADDITIONAL FLIGHT OPERATIONAL CONSIDERATIONS AND LIMITATIONS ARE COVERED IN THE CF6-80 SPECIFIC OPERATING INSTRUCTIONS. OPERATION EXCEEDING THESE LIMITS CAN CAUSE FUEL PUMP CAVITATION RESULTING IN EXCESSIVE PUMP DETERIORATION AND POSSIBLE ENGINE MALFUNCTION. IF LIMITS ARE EXCEEDED, FUEL PUMP SHOULD BE RETURNED TO OVERHAUL.

(a)Aviation Gasoline

NOTE : If operation using emergency fuel Aviation Gasoline (all grades) is necessary, the specific gravity setting must be adjusted to 0.70. It is necessary to maintain a record in the aircraft flight log and the engine records of all operations using aviation gasoline.

G. Hight Nacelle Temperature Indication

Engine operation with high nacelle temperature indications may result in heat damage to thrust reverser pressure regulating and shut-off valve and to VSV actuators, due to leaks at casing, air bleed ducts or all system lines.

NOTE : A corrective action must be carried out when nacelle temperatures exceed the limits recommended. (Ref. Fig. 513).

(1)Trouble shooting should be implemented.

(a)When there is an inadvertent fire warning due to hot air leaking on a fire detection loop.

(b)When a pressure relief door is open, usually indicating a massive failure.

(c)When obvious heat distress or discoloration of adjacent structure, components or electrical wiring is detected.

(d)When components are replaced repeatedly.

(2)Nacelle temperature check

It is recommended to check or note nacelle temperature indications under the following conditions :

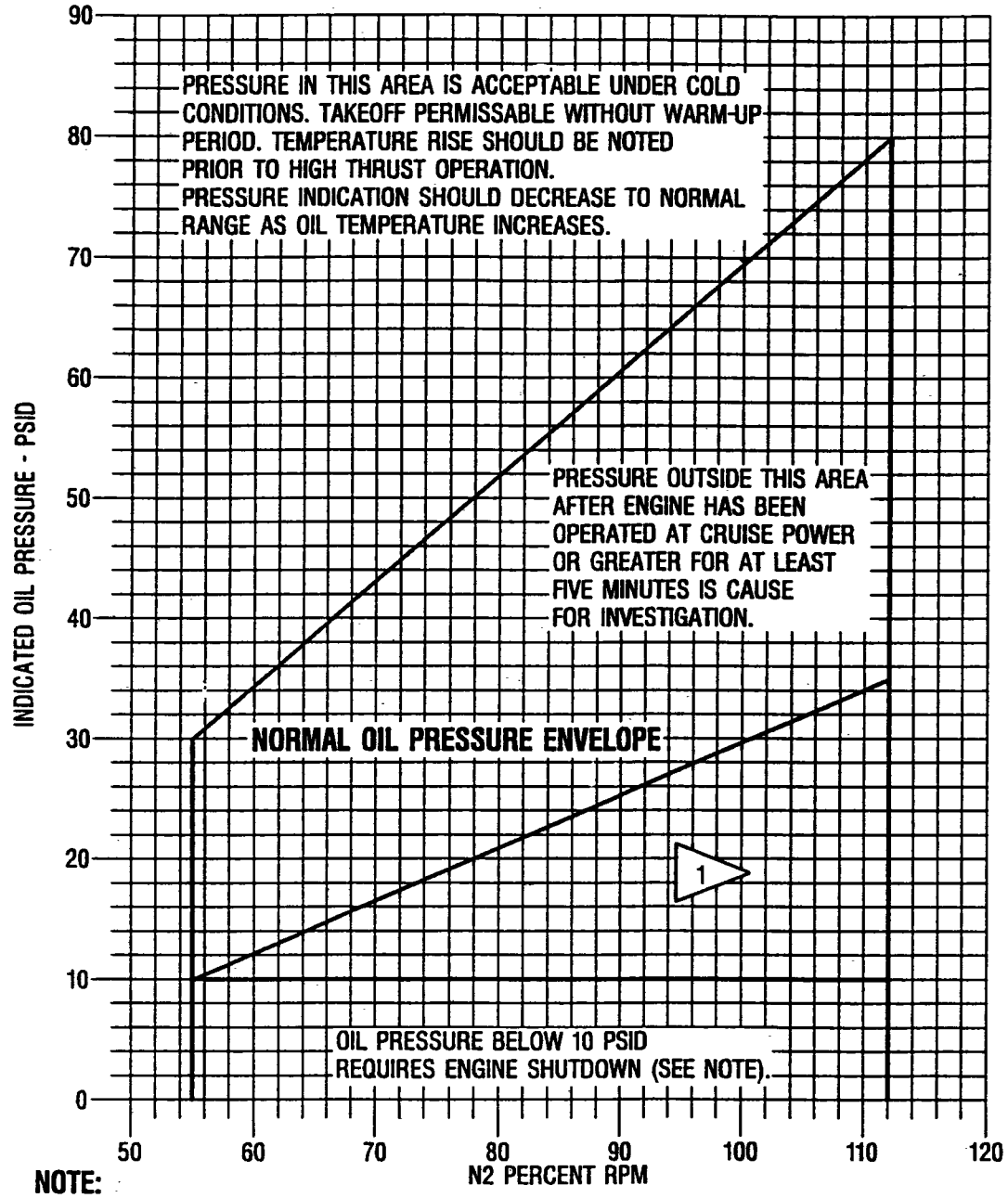
(a)Ground operation for at least 3 minutes with N1 > 60 %.

(b)Flight operation

During normal climb with engines operating at climb power for at least 3 minutes.

H. There are different indications which can show if the engine has fuel contamination in the oil system. They are as follows :

(1)Flight crew indication of oil level increase during the flight before.


PRESSURE IN THIS AREA IS ACCEPTABLE UNDER COLD CONDITIONS. TAKEOFF PERMISSABLE WITHOUT WARM-UP PERIOD. TEMPERATURE RISE SHOULD BE NOTED PRIOR TO HIGH THRUST OPERATION. PRESSURE INDICATION SHOULD DECREASE TO NORMAL RANGE AS OIL TEMPERATURE INCREASES.
PRESSURE OUTSIDE THIS AREA AFTER ENGINE HAS BEEN OPERATED AT CRUISE POWER OR GREATER FOR AT LEAST FIVE MINUTES IS CAUSE FOR INVESTIGATION.
NORMAL OIL PRESSURE ENVELOPE
1
OIL PRESSURE BELOW 10 PSID REQUIRES ENGINE SHUTDOWN (SEE NOTE).
INDICATED OIL PRESSURE - PSID
0
10
20
30
40
50
60
70
80
90
50
60
70
80
90
100
110
120
N2 PERCENT RPM

NOTE:
DURING "NEGATIVE-G" OPERATING CONDITIONS, OIL PRESSURE LESS THAN 10 PSID IS PERMISSIBLE FOR A MAXIMUM TIME LIMIT OF 30 SECONDS.

1 GROUND: PRESSURE IN THIS AREA REQUIRES CORRECTION BEFORE NEXT FLIGHT.

IN FLIGHT: PRESSURE IN THIS AREA REQUIRES MONITORING OF TEMPERATURE AND PRESSURE. SHUTDOWN ENGINE IF OIL TEMPERATURE IS EXCEEDED.

1117522-00-B

BM5 71 00 00 5 LRMO 02

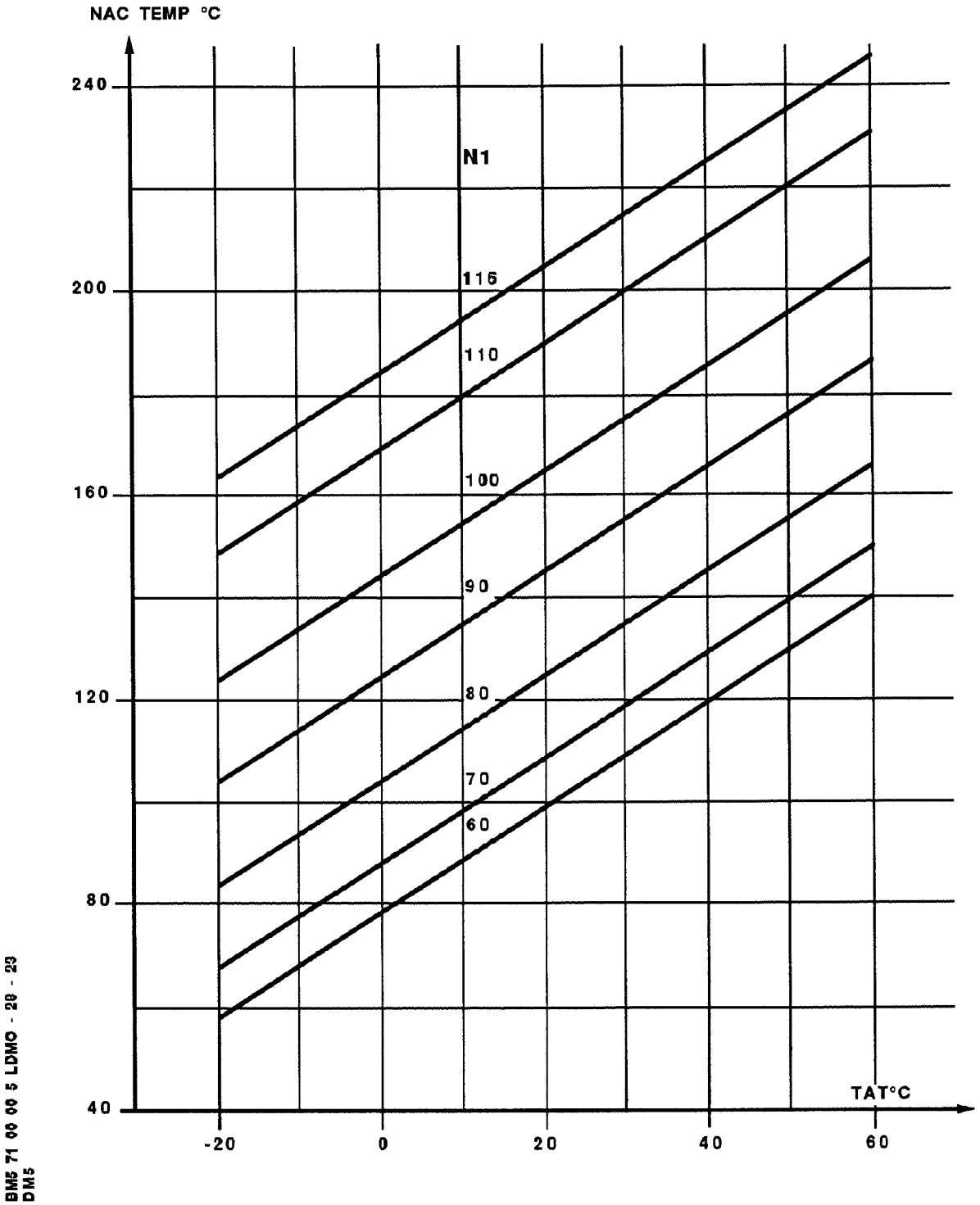
Oil Pressure vs Core Engine Speed
Figure 512

This can occur with an oil pressure decrease and an oil temperature increase.

(2)Cabin crew indication of fumes in the cabin during the flight before.

(3)Indication of fuel odor in the oil tank post-flight.

(4)Fuel detection equipment indication of fuel in the oil tank post-flight.



High Nacelle Temperature Indication
Figure 513

5. Procedure in Case of Engine Fire

WARNING : PROCEDURE IN CASE OF ENGINE FIRE. ENGINE FIRES ARE OF TWO TYPES.
- INTERNAL FIRE
- EXTERNAL FIRE IN NACELLE

A. Internal Fire
(1)Indications.
- EGT increases rapidly when HP fuel shut off valve control lever is placed in ON position.
- Internal exhaust nozzle fire reported by ground crew.

CAUTION : DO NOT USE EXTERNAL FIRE AGENT AS SERIOUS ENGINE DAMAGE MAY RESULT.

(2)Procedure
Interrupt start immmediately using the following procedure :
- place HP fuel shut off valve control lever in OFF position
- place croosfeed valve pushbutton switch manually in line

CAUTION : IF OPEN LIGHT HAS EXTINGUISHED (N2 ABOVE 45%) WAIT UNTIL N2 DECREASES TO 30% THEN PRESS START PUSHBUTTON SWITCH.

- place ENG START selector switch in CRANK position until any fire evidence has disappeared.
- place ENG START selector switch in OFF position
- perform engine overtemperature inspection (Ref. 72-00-00, P. Block 601)

B. External Fire in Nacelle
Fire indicated by fire detection loops can be extinguished using the onboard fire extinguished system.
Place :
- Throttle control lever in IDLE position
- HP fuel shut-off valve control lever in OFF position
- Pull ENG 1 FIRE (ENG 2 FIRE) handle
- Discharge one fire extinguisher bottle by pressing AGENT 1 pushbutton switch.
- If the fire persists, discharge the second bottle by pressing AGENT 2 pushbutton switch.
- ENG START selector switch in OFF position

If the fire is not completely extinguished by this procedure choose appropriate access to engine and extinguish fire with fire extinguisher.
Replace fire extinguisher bottles (Ref. 26-21-15, P. Block 401).

CAUTION : IF FIRE EXTINGUISHER IS USED SEE 72-00-00, P. BLOCK 601, PARA. 3 SPECIAL INSPECTIONS.

6. Abnormal Operations

This paragraph describes abnormal condition limits which may be encountered during engine operation and the emergency action necessary to eliminate these conditions. Refer to Trouble Shooting Manual to correct the malfunctions causing the abnormal operations.

A. No Start

If engine ignition does not occur within the prescribed time or fuel flow limits, check for a malfunctioning Main Engine Control or faulty ignition system. Use an alternate ignition system to make a second start attempt, if unable to start the engine refer to trouble to start on either ignition system should be properly recorded, investigated and remedied.

B. Hot Start

CAUTION : ALL HOT STARTS AND OVERTEMPERATURES MUST BE RECORDED IN MAINTENANCE RECORDS. HIGH EGT'S HAVE A DIRECT BEARING ON THE SERVICE LIFE OF TURBINE BLADES AND TURBINE WHEELS. EXCESSIVE AND REPEATED TURBINE OVERTEMPERATURES WILL RESULT IN SUBSEQUENT DAMAGE TO THE ENGINE.

EGT indication during a hot start occurs at ignition, increases rapidly, and exceeds limits if the start is not terminated immediately. Faulty fuel scheduling (excessively high F/A ratios), low starting air pressures, a faulty starter valve, or in-flow bleed are causes of a hot start. By proper monitoring of fuel flow and EGT, a hot start can be avoided if the start is discontinued before EGT limits are exceeded.

(1)In the event of a hot start, stop starting cycle as follows :

- place HP fuel shut-off valve control lever in OFF position
- allow engine to run on for 30 seconds
- stop starter by placing ENG START selector switch in OFF position.

C. Hung Start

During a hung start, the engine ignition is normal. But the engine N1, instead of accelerating normally to idle, remains at a lower value and a temperature rise of EGT to a higher than normal level. The hung start should be aborted when the condition is recognized (Ref. para. B).

NOTE : Low starting torque may result in prolonged time to idle. This should not be misconstrued as a hung start since a satisfactory start still can be made as long as EGT rise is normal.

D. Overtemperature

Adhere to EGT limits for all normal engine operations. All temperature above these limits are considered to be overtemperatures.

NOTE : Duration and temperature of all engine overtemperatures must be recorded in maintenance records. Corrective maintenance action is required if EGT exceeds temperature and time limits (Ref. 72-00-00, P. Block 601).

E. Low or No Oil Pressure

If oil pressure drops to 10 psi (0.7 bar) or below, the engine must be shut

down and the cause investigated.

F. Scavenge Oil Overtemperature

R If scavenge oil temperature above 160°C (320°F) up to 175°C (347°F) maximum are limited to 15 minutes, reduce power to bring temperature within limits. Maximum allowable continuous operating time between 160°C (320°F) and 175°C (347°F) is 15 minutes. To bring temperatures back to normal oil supply temperatures, reduce power. Engine operation above 175°C (347°F) is not permitted. Maximum temperature should be recorded in maintenance logs. Abnormally high scavenge oil temperatures indicate lubrication system problems and should be promptly investigated (Ref. Trouble Shootings).

G. Core Engine Overspeed

Maximum N2 is 112.5 percent. The throttle must be retarded to prevent N2 from exceeding this limit. If core engine does overspeed, the engine must be inspected (Ref. 72-00-00, P. Block 601).

H. Fan Overspeed

Maximum N1 is 117.5 percent. The throttle must be retarded to prevent N1 from exceeding this limit. If fan rotor does overspeed, the engine must be inspected (Ref. 72-00-00, P. Block 601).

R J. Compressor Stall

A compressor stall is caused by an aerodynamic disturbance of the normally smooth airflow through the compressor and usually is accompanied by an audible report. A compressor stall, which does not clear itself, is evident by a rapid EGT rise, N1 drop or hang-up, and no engine response when the throttle is advanced.

The engine operation should be stall-free throughout the entire operating range. However, if a stall (except for "hard" stall) occurs, perform the following procedure :

CAUTION : IF A "HARD" STALL (DEFINED AS A STALL WITH AN AUDIBLE BANG AND AN INLET OR EXHAUST FLAME) OCCURS, THE ENGINE SHOULD BE SHUT DOWN AND EXAMINED (Ref. 72-00-00, P. Block 601 - STALL INSPECTION).

(1)Place throttle control lever in idle position.
(2)Ensure that EGT is within limits.
(3)Cautiously advance the throttle to determine if stall will recur and the rpm follows throttle movement.
(4)If a stall does not recur, proceed with normal operation. At earliest opportunity, investigate cause of stall and correct malfunction.
CAUTION : REPEATED STALLS MAY RESULT IN DAMAGE TO COMPRESSOR BLADES, VANES AND CASES.
(5)If a stall does recur, operate at least 5 percent below the N2 percent at which the stall occurs. Investigate stall cause and correct malfunction.

R K. Engine Flameout

An engine flame-out can be recognized by an immediate decrease in EGT and N1 followed by a decrease in N2 and fuel flow.

In case of engine flame-out, perform the following procedure :
Place :
- throttle control lever in idle position
- HP fuel shut off valve control lever in OFF position
- motor engine to purge residual fuel from the engine (Ref. paragraph 8. Dry Motoring).

R L. Engine Failure
An indication of an impending engine structural failure can be excessive vibration with corresponding changes in engine parameters. Do not attempt to restart an engine which is definitely known to have failed ; because additional damage to the engine and possibly to the aircraft is likely to result.
The following procedure should be used in engine failures :
- Place throttle control lever in idle position
- Place HP fuel shut off valve control lever in OFF position
- Place ENG START selector switch in OFF position.

7. Prepare for Run Procedure

WARNING : BEFORE STARTING ONE OR BOTH ENGINES ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION. (REF. PARA. 3.H.).
CAUTION : PRIOR TO STARTING ENGINE, CHECK THAT THE THRUST REVERSER CONTROL LEVERS ARE IN STOWED POSITION AND THRUST REVERSERS ARE FUNCTIONALLY CLEARED TO STOW.
CAUTION : DO NOT EXCEED OPEN COWLING LIMITATIONS DURING TESTING.
CAUTION : OPERATOR MUST BE THOROUGHLY FAMILIAR WITH OPERATING LIMITS BEFORE RUNNING ENGINE.
CAUTION : DO NOT ATTEMPT TO STOP FAN ROTATION BY HAND.

A. Job Set-Up
NOTE : Procedure is identical for LH and RH engines.
NOTE : Job Set-Up is similar for :
- Dry motoring
- Wet motoring
- Engine run

(1)Make certain that aircraft is headed into the wind to prevent that exhaust gas ingestion by engine.
(2)Make certain that landing gear ground safeties including wheels chocks are in position.
(3)Remove engine inlet and exhaust covers.
(4)Check that pylon pressure relief doors are closed.
(5)Check engine air intakes.
(a)Check the absence of foreign objects.
(b)Check that fan blades and spinner are in correct condition.
(c)Check that fan rotates freely.
(d)Check that air intake skin is in good position.
NOTE : If an engine has been exposed to freezing air or snow ice and snow may have accumulated in the fan section and low pressure turbine area. Whenever there is a possibility of this having occurred, the fan must be checked for free rotation prior to attempting a start. If rotation is hindered by ice or snow, heat areas affected with hot air prior to an engine start.
(6)Check fan reverser for damage, security of components and proper stowage.
(7)Check fan outlet and exhaust nozzle for correct condition and absence of foreign objects.
(8)Check anti-icing exit duct on nose cowl for clearance.
(9)Check that oil tank contains at least 10.52 US. Quarts. (10 liters) (Ref. 12-13-79, P. Block 1).
(10)Check CSD oil level (Ref. 12-13-24, P. Block 1).
(11)Check starter oil level (Ref. 12-13-80, P. Block 1).
(12)Check external surfaces of cowling and rain ports for evidence of hydraulic fluid, oil and fuel leakages.
(13)Check that all access doors and cowls are closed and properly latched.
(14)Check that safety areas, are clean of equipment, tools, other foreign objects and personnel.
(15)Check that fire fighting personnel is present.
(16)Connect electrical ground power unit and energize the aircraft electrical

network (Ref. 24-41-00, P. Block 301).

(17)Check operation of ignition systems. Properly operating igniters give 1 to 5 sharp cracking sounds per second.

NOTE : The ignition system check indicates circuit continuity and operation but does not assure spark energy is adequate for ignition.

(18)Check that all circuit breakers are closed.

(19)On panel 9VU

- check that parking brake control handle is pulled.
- check that ENG 1 (ENG 2) HP fuel shut off valve control lever is in OFF position
- check that throttle control lever LH (RH) in idle position.

(20)On panel 4VU

- check that brake pressure indication on the triple indicator is correct.

If necessary repressurize the braking system using pushbutton switch 8GX on panel 9VU.

- check that landing gear normal control lever is in down position.

(21)On overhead panel

(a)Test fire detection loops.

(b)Test ENG 1 (2) fire extinguisher bottle percussion (SQUIB TEST).

(c)Check that SMOKE warning operates correctly (Ref. 26-21-00, P. Block 501).

(d)Check that pylon and wing ambient overheat detection systems operate correctly.

(e)Check that interphone system operates correctly. Contact the ground staff chief member.

Check that the aircraft is cleared and that nobody remains in the dangerous area.

(22)On panel 430VU

(a)Check that fuel pumps operate correctly.

(b)Check that flowbar of FUEL/ISOL VALVES/ENG 1 (ENG 2) pushbutton switches shows continuity.

(c)Check that fuel quantity is sufficient for operation.

(23)On panel 427VU

(a)Check that level of hydraulic fluid in tanks is correct.

(b)Check that hydraulic system warnings operate correctly.

(c)Check that HYD PWR/B, G, Y/PUMPS/ENG 1 (ENG 2) pushbutton switches are pressed (OFF legend off).

(d)Check that hydraulic tanks are pressurized.

(24)On panel 471VU

(a)Check that OPEN legend of all HYD PWR/FIRE VALVES annunciators is on.

(25)On main instrument panel

(a)Check that oil level indication on the indicator is correct.

(b)Align the mobile index on the quantity displayed.

(c)Select ENG page on the ECAM system (Ref. 31-51-00).

(26)Start the APU (Ref. 49-00-00, P. Block 501).

NOTE : Engine starting can be accomplished using any of the following sources :

(a)Pneumatic power from ground power unit to aircraft pneumatic system and external AC power.

(b)Pneumatic power from operating engine and external AC power.
(c)Pneumatic power from ground power unit connected to aircraft pneumatic system, or pneumatic power from operating engine and DC electrical power from aircraft battery.
(d)Pneumatic and AC electrical power from auxiliary power unit (APU).

8. Motoring

A. Dry Motoring

WARNING : MAKE SURE THAT THE TRAVEL RANGES OF THE FLIGHT CONTROL SURFACES ARE CLEAR BEFORE MOTORING THE ENGINE. MOVEMENT OF THE FLIGHT CONTROL SURFACES CAN BE DANGEROUS AND/OR CAUSE DAMAGE.

CAUTION : MAKE SURE THAT THERE IS NO HYDRAULIC GROUND POWER SUPPLY CONNECTED TO THE AIRCRAFT WHEN YOU DO THIS PROCEDURE. IF A GROUND POWER SUPPLY IS CONNECTED, THERE IS A RISK OF DAMAGE TO THE ENGINE PUMPS.

The dry motoring check may be required during or after inspection or maintenance. It ensures that the engine rotates freely, instrumentation functions properly, and starter operation meets speed requirements for successful starts. Also, it primes and leak checks the lube system when maintenance has required the replacement of lube system components.

CAUTION : THE FUEL PUMP AND MAIN ENGINE CONTROL ARE FUEL LUBRICATED. DO NOT MOTOR, START, OR OPERATE THE ENGINE UNLESS A POSITIVE FUEL INLET PRESSURE IS INDICATED.

CAUTION : ENGINE DRIVEN HYDRAULIC PUMPS ARE HYDRAULIC FLUID LUBRICATED. DO NOT MOTOR ENGINE UNLESS HYDRAULIC TANK PRESSURE VALUE IS WITHIN NORMAL OPERATING RANGE.

CAUTION : DURING COLD WEATHER, FULL SCALE OIL PRESSURE SURGES OF 150 PSI (10.34 BARS) MAY OCCUR.

CAUTION : HP FUEL SHUT OFF VALVE CONTROL LEVER MUST BE IN OFF POSITION BEFORE FUEL BOOST PUMPS ARE TURNED ON AND CIRCUIT BREAKERS 3KC AND 4KC ARE OPENED.

NOTE : Fuel components that have Fluorocarbon (Viton) external seals (SB 73-079) can leak for a short period of time when they are below -29°F (-34°C). If a leak occurs, do not remove the component until you complete an engine start (Ref. Paragraph 9).

(1)On panel 9VU, place the ENG 1 and ENG 2 HP VALVE control levers in OFF position. On panel 9VU, on the ENG 1 and ENG 2 HP VALVE control levers, check that the HP VALVE light goes off.

(2)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENGINES ENG 1 & 2/IGNITION/SYS A	1JH	334/S72
133VU	ENGINES ENG 1 & 2/IGNITION/SYS B	2JH	333/T72
133VU	ENGINES ENG 1/FUEL HP VALVE/CTL	3KC	333/T69
133VU	ENGINES ENG 2/FUEL HP VALVE/CTL	4KC	333/T70

(3)On panel 437VU
- check that starting air pressure is between 25 and 55 psi.

(4)On panel 430VU
- press all FUEL/PUMPS pushbutton switches (OFF legend off).

(5)On panel 429VU
(a)Place ENG START selector switch in CRANK position.
(b)White ARM legend or ENG START/START 1 (START 2) pushbutton switch comes

on.
(c)LH and RH air conditioning packs close.
(d)Press ENG START/START 1 (START 2) pushbutton switch.
APU rating increases to N1 (Ref. Chapter 49).
- white ARM legend goes off.
- starter valve opens.
- blue OPEN legend comes on.
- starter is engaged.
NOTE : If starter valve fails to open automatically, it can be opened manually, respecting safety area access.
(6)Check for oil pressure indication.
(7)Continue motoring engine as required to performed check.
NOTE : Starter operating limits must be observed.
(8)Place ENG START selector switch in OFF position.
- ENG START/START 1 (START 2) pushbutton switch is released and OPEN legend goes off.
- The starter valves close.
- Air conditioning packs open.
(9)During engine coast down, make the following checks :
(a)Listen for unusual noises from the rotating components, and check the engine, fan frame and turbine areas for unusual roughness.
NOTE : Normal rotational noise consists of clicking compressor and turbine blades, gear noise and seal rubs.
(10)Inspect lube system lines, fittings and accessories for leakage.
(11)Check oil level in the oil tank, top up if necessary (Ref. 12-13-79, P. Block 1).
(12)On panel 430VU
- Release all FUEL/PUMPS pushbutton switches (OFF legend on).
(13)Inspect the oil and fuel system lines, fittings and accessories for leakage.
(14)Remove safety clips and tags and close circuit breakers 1JH, 2JH, 3KC (4KC).

B. Wet Motoring

WARNING : MAKE SURE THAT THE TRAVEL RANGES OF THE FLIGHT CONTROL SURFACES ARE CLEAR BEFORE MOTORING THE ENGINE. MOVEMENT OF THE FLIGHT CONTROL SURFACES CAN BE DANGEROUS AND/OR CAUSE DAMAGE.

WARNING : DO NOT PERFORM WET MOTORING IN A HANGAR OR IN A CLOSED AREA A LARGE QUANTITY OF HIGHLY FLAMMABLE FUEL VAPORS COME OUT FROM THE ENGINE DURING THIS PROCEDURE AND THERE IS A RISK OF FIRE.

CAUTION : MAKE SURE THAT THERE IS NO HYDRAULIC GROUND POWER SUPPLY CONNECTED TO THE AIRCRAFT WHEN YOU DO THIS PROCEDURE. IF A GROUND POWER SUPPLY IS CONNECTED, THERE IS A RISK OF DAMAGE TO THE ENGINE PUMPS.

Wet motoring procedures are used for maintenance checks requiring core engine rotation and fuel flow without ignition.
Some of the reasons for wet motoring are to check fuel system for leaks, and for depreservation and priming of the fuel system.

CAUTION : FUEL PUMP AND MAIN ENGINE CONTROL ARE FUEL LUBRICATED. DO NOT MOTOR ENGINE UNLESS A POSITIVE FUEL INLET PRESSURE IS INDICATED.

CAUTION : ENGINE DRIVEN HYDRAULIC PUMPS ARE HYDRAULIC FLUID LUBRICATED. DO NOT MOTOR ENGINE UNLESS HYDRAULIC TANK PRESSURIZATION VALVE IS WITHIN NORMAL OPERATING RANGE.

CAUTION : OBSERVE ALL SAFETY PRECAUTIONS PRIOR TO WET MOTORING THE ENGINE. FUEL MIST EXHAUSTED BY THE ENGINE CREATES AN EXTREME FIRE HAZARD.

(1)Open, safety and tag circuit breakers 1JH and 2JH.
(2)On panel 437VU
- Check that the starting air pressure is between 25 and 55 psi (1.7 and 3.8 bars).
(3)On panel 430VU
- Press all FUEL/PUMPS pushbutton switches (OFF legend off).
- Check that fuel pressure is approximately 40 psig (2.8 bars).
(4)On panel 429VU
(a)Place ENG START selector switch in CRANK position.
(b)White ARM legend comes on
- LH and RH air conditioning packs close.
(c)Press ENG START/START 1 (START 2) pushbutton switch
- white ARM legend goes off
- Starter valve opens
- Blue OPEN legend comes on
- Starter is engaged.

NOTE : If starter valve fails to open automatically it can be opened manually, respecting safety area access.

CAUTION : ON ECAM SYSTEM
CHECK THAT OIL PRESSURE INDICATION ON ENG 1 (ENG 2) INDICATOR INCREASES. IF IT HAS NOT INCREASED AFTER 30 SECONDS, DISCONTINUE MOTORING.

(5)When engine core speed (N2) reaches 15%, place ENG 1 (ENG 2) HP fuel shut off valve control lever in ON position.

CAUTION : FUEL FLOW GREATER THAN 318 Kg/H (700 pph) AFTER 15 SECONDS INDICATES AN INTERNAL PROBLEM IN THE MEC WHICH COULD RESULT

IN HIGH FUEL FLOW (TORCHING) DURING START.

(6)Continue motoring engine for 15 to 30 seconds maximum while observing fuel flow.

NOTE : If fuel flow exceeds 318 Kg/H (700 pph) after 15 seconds, replacement of Main Engine Control is required.

(7)Place HP fuel shut off valve control lever in OFF position and check that fuel flow drops to zero.

(8)Continue motoring for 30 seconds in order to evacuate fuel from combustion chamber.

CAUTION : DURING WET MOTORING OPERATIONS, RESPECT STARTER UTILIZATION LIMITS.

(9)Place ENG START selector switch in OFF position

- ENG START/START 1 (START 2) pushbutton switch is released
- OPEN legend of ENG START/START 1 (START 2) pushbutton switch goes off
- Starter valves closes
- LH and RH air conditioning packs open.

(10)During engine coast down, make the following checks :

(a)Listen for unusual noise from the rotating components, and check the engine, fan frame and turbine areas for unusual roughness.

NOTE : Normal rotational noise consists of clicking compressor and turbine blades, gear noise, and seal rubs.

(b)Inspect the fuel system lines, fittings and accessories for leakage. the fuel system lines, fittings and accessories for leakage.

(c)Check the concentric fuel shroud for leakage. No leakage is allowed. The presence of fuel in the shrouding indicates a leak somewhere in
R the system and requires further investigation. Do a leak test of the
R drain manifold and drain shrouds as included in (Ref. 73-13-01,
R P. Block 401).

(11)On panel 430VU

- Release all FUEL/PUMPS pushbutton switches (OFF legend on).

(12)Remove safety clips and tags and close circuit breakers 1JH and 2JH.

(13)Inspect lube system lines, fittings and accessories for leakage.

R (14)Check oil level in the oil tank, top up if necessary (Ref. 12-13-79, P. Block 1).

9. Engine Run

WARNING : MAKE SURE THAT FOR THE ENGINE GROUND RUN TEST :
- THE AIRCRAFT IS IN A CLEAR AREA SPECIFIED FOR ENGINE GROUND RUN WITH NO OBSTACLE NEARER THAN 50 METERS (164 FT) IN FRONT OF THE AIRCRAFT.
- THE AIRCRAFT IS STOPPED AND CANNOT MOVE DURING THE ENGINE GROUND RUN.

IF DURING THE ENGINE GROUND RUN TEST THE AIRCRAFT STARTS TO MOVE FORWARD :
- DECREASE THE ENGINE THRUST IMMEDIATELY.
- STOP THE AIRCRAFT WITH THE PARKING BRAKE.

NOTE : Fuel components that have Fluorocarbon (Viton) external seals (SB 73-079) can leak for a short period of time when they are below -29°F (-34°C). If a leak occurs, continue the start to idle.
- If the fuel leakage stops in less than 5 minutes at idle, continue operation of the engine.
- If the fuel leakage continues after 5 minutes at idle, shut down the engine and repair the source of the leakage.

A. Starting

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION. (REF. PARA. 3.H.)

WARNING : BEFORE YOU OPERATE THE ENGINES AT POWER SETTINGS ABOVE IDLE, MAKE SURE THAT ACCESS DOOR 136AR IS OPEN. THIS IS TO MAKE SURE THAT THERE IS NO RISK OF RESIDUAL PRESSURE IN THE AIRCRAFT AFTER ENGINE SHUTDOWN.
IF PERSONNEL TRIES TO OPEN A DOOR WHEN THERE IS RESIDUAL PRESSURE IN THE AIRCRAFT :
- THE DOOR CAN OPEN WITH DANGEROUS SUDDEN FORCE AND
- THERE IS A RISK OF DEATH OR BAD INJURY AND DAMAGE TO THE AIRCRAFT.

WARNING : MAKE SURE THAT :
- THE PASSENGER DOORS ARE CLOSED AND THE PASSENGER LOADING STAIRS ARE REMOVED WHEN AT LEAST ONE ENGINE IS OPERATE ABOVE IDLE POWER
- THE CARGO DOORS ARE CLOSED AND CARGO LOADING EQUIPMENT IS REMOVED WHEN :
  . ENGINE 2 IS OPERATED AT IDLE OR ABOVE
  . AT LEAST ONE ENGINE IS OPERATED ABOVE IDLE POWER.

IF YOU DO NOT OBEY THESE PRECAUTIONS INJURY TO THE PERSONNEL AND DAMAGE TO THE AIRCRAFT AND/OR EQUIPMENT CAN OCCUR.

CAUTION : MAKE SURE THAT THERE IS NO HYDRAULIC GROUND POWER SUPPLY CONNECTED TO THE AIRCRAFT WHEN YOU DO THIS PROCEDURE. IF A GROUND POWER SUPPLY IS CONNECTED, THERE IS A RISK OF DAMAGE TO THE ENGINE PUMPS.

CAUTION : OPERATIONAL CONDITIONS MAY NECESSITATE THE USE OF STARTER INLET AIR PRESSURE BELOW 25 PSI.
SHOULD THESE CONDITIONS ARISE, EXTENDED TIME TO IDLE AND HIGHER EGT PEAKS MAY RESULT.

UNDER THESE CONDITIONS, THE START CYCLE MUST BE CLOSELY MONITORED AND APPROPRIATE ACTION TAKEN TO PREVENT A HUNG OR OVERTEMPERATURE START.

CAUTION : FUEL PUMP AND MAIN ENGINE CONTROL ARE FUEL LUBRICATED. DO NOT START ENGINE UNLESS A POSITIVE FUEL INLET PRESSURE IS INDICATED.

CAUTION : ENGINE DRIVEN HYDRAULIC PUMPS ARE HYDRAULIC FLUID LUBRICATED. DO NOT START ENGINE UNLESS HYDRAULIC TANK PRESSURIZATION VALUE IS WITHIN NORMAL OPERATING RANGE.

CAUTION : ONLY THREE SUCCESSIVE ENGINE START ATTEMPTS ARE ALLOWED. IF ENGINE FAILS TO START AFTER THE THIRD ATTEMPT, DRY MOTOR DURING 2 MINUTES, SHUT DOWN ENGINE AND REFER TO TROUBLE SHOOTING MANUAL.

NOTE : There is possibility to have an intercommunication between ground crew and flight compartment during engine run-up by using appropriate jack.

(1)Open access door 136AR and put a warning notice on the door to tell persons that the door must stay open to prevent unwanted pressurization.

NOTE : This is to prevent unwanted pressurization of the aircraft if one or both engines operate at more than idle power.

R (2)Put chocks in position in front of each forward MLG wheel.

NOTE : If engine start is followed by a high power run, use CHOCK-MLG, ENGINE RUN-UP (98F10103500000).

R (3)There must be two qualified persons in the cockpit when performing an
R engine run above idle. One must monitor the outside and the aircraft
R behaviour while the other performs the engine test.

R (4)If the aircraft begins to move while performing an engine run,
R immediately set all the thrust levers to idle position.

R (5)Place throttle control lever in idle position.

NOTE : The throttle functions best with smooth and steady movements. Avoid sharp or abrupt throttle changes, except in an emergency engine shutdown situation.

R (6)Make sure that all the pneumatic and electrical loads are OFF.

R (7)On panel 430VU
- press all FUEL/PUMPS pushbutton switches (OFF legend off)
- check that fuel pressure is approximately 40 psi (2.8 bars).

R (8)On panel 429VU

(a)Place the ENG START selector switch in START A or START B position
- white ARM legend of ENG START/START 1 (START 2) comes on
- LH and RH air conditioning packs close.

R (9)On panel 437VU
- check that the starter air pressure is between 25 and 55 psi (1.68 and 3.86 bars).

R (10)On panel 429VU

(a)Press ENG START/START 1 (START 2) pushbutton switches.

R (11)On panel 437VU
- check again that the starter air pressure is between 25 and 55 psi (1.68 and 3.86 bars).

R (12)On panel 429VU

(a)APU rating increases to N1 (Ref. Chapter 49).
- white ON legend goes off
- starter valve opens
- blue OPEN legend comes on

- starter is engaged.

NOTE : If starter valve fails to open automatically, it can be opened manually respecting safety area access.

CAUTION : CHECK THAT OIL PRESSURE INDICATION ON ENG 1 (ENG 2) INDICATOR INCREASES.
IF IT HAS NOT INCREASED AFTER 30 SECONDS, DISCONTINUE STARTING OPERATIONS.

R (13)When N2 core speed reaches 15% minimum , place HP fuel shut off valve control lever in ON position. Observe : fuel flow, Exhaust Gas Temperature (EGT) and oil pressure readings - Normal fuel flow is 227-272 kg/H (500-600 pph).

CAUTION : A FUEL FLOW GREATER THAN 320 KG/H MAY CAUSE EGT LIMITS TO BE EXCEEDED. DISCONTINUE STARTING PROCEDURE BY PLACING HP FUEL SHUT OFF VALVE CONTROL LEVER IN OFF POSITION.
IF START IS ABORTED, DRY MOTOR THE ENGINE FOR 30 SECONDS THEN STOP THE STARTER BY PLACING IGNITION SELECTOR SWITCH IN OFF POSITION. DO NOT ATTEMPT TO MODULATE FUEL FLOW USING HP FUEL SHUT OFF VALVE.

CAUTION : IF LIGHTOFF DOES NOT OCCUR WITHIN 25 SECONDS, PUT THE HP FUEL SHUTOFF VALVE CONTROL LEVER IN THE OFF POSITION AND LET THE ENGINE ROTOR CONTINUE TO TURN FOR AT LEAST 30 SECONDS. PUT THE IGNITION SELECTOR SWITCH IN THE OFF POSITION. LET THE ENGINE SLOW DOWN TO A COMPLETE STOP BEFORE YOU TRY TO START THE ENGINE AGAIN.

CAUTION : IF POSITIVE OIL PRESSURE IS NOT INDICATED WHEN CORE ENGINE REACHES STABILIZED IDLE, PLACE HP FUEL SHUTOFF VALVE CONTROL LEVER AND IGNITION SELECTOR SWITCH IN OFF POSITION.

R (14)Continue to monitor the EGT, fuel flow, RPM and oil pressures values. Lightoff must occur in 25 seconds or less after you put the HP shut off valve control lever in the ON position.

R (15)When the N2 reaches 44-46 percent :

(a)Ensure the starter has stopped.

(b)Make sure EGT Normal 400-580°C (752-1076°F).

(c)Look for positive oil pressure of 30-74 psig (2.07 - 5.10 bars).

CAUTION : DO NOT GO ABOVE MINIMUM IDLE RPM AND 30 SECONDS OF ENGINE OPERATION WITH THE FAN ROTOR NOT ROTATING.

(d)Look for positive fan rpm (N1). If "NO" indication, do as follows :

1 Put the HP fuel shut off valve control lever and ENG START selector switch in the OFF position.

2 Immediately after the core engine rotation (N2) stops, make a re-start of the engine and maintain minimum idle for 30 seconds.

3 If the fan (N1) still does not rotate, shut the engine down and find cause.

R (16)Allow the engine to stabilize at IDLE. Make sure the engine instrumentation indications are in operation limits.

R (17)Place the ENG START selector switch in the OFF position.

B. Engine Shutdown

These procedures keep to a minimum thermal shock to internal/external sections of the engine during adjustment, functional or shutdown procedures, and decrease possible damage to the seals and rotating parts when the engine is set in the OFF condition. If these procedures are followed, the engine will have a longer and better serviceable life.

(1)Prior to shut down

Operate the engine near idle for 5 minutes to bring the hot section of the engine to a stable temperature.

NOTE : To make maintenance easier, reversers may be opened before the engine is shut down.

(2)Visually make sure the oil quantity indication is 19 quarts (18 liters) or less. If the oil quantity is more than 19 quarts (18 liters), do the high oil quantity trouble shooting procedure.

(3)Shut down

(a)Put the throttle control lever in the idle position.

(b)Put the HP fuel shut off valve control lever in the OFF position.

1 Monitor the EGT for indication of post-shutdown fire. If a continuous EGT decrease does not occur after shutdown be prepared to motor the engine or take other approved steps.

2 Monitor the engine coastdown from idle to stop and listen for any unusual noises from the rotating components of the engine, fan frame and turbine areas.

3 Place FUEL/PUMPS switches in OFF position.

C. Close-Up

NOTE : Job close-up is similar for :
- Dry motoring
- Wet motoring
- Engine run.

(1)Inspect the lube system lines, fittings and accessories for leakage.

(2)Do the engine oil servicing (Ref. 12-13-79, P. Block 1).

Make sure there is no sign of fuel contamination in the oil.

WARNING : HOT OIL CAN CAUSE SERIOUS INJURY.
THE ENGINE MUST BE STOPPED FOR A MINIMUM OF FIVE MINUTES BEFORE YOU REMOVE THE OIL FILLER CAP.
THIS PERMITS THE PRESSURE IN THE OIL TANK TO BLEED OFF. HOT OIL FROM THE OIL TANK IS DANGEROUS AND CAN BURN YOU.

(3)Examine the oil level in the oil tank. If necessary, fill the oil tank to the correct level (Ref. 12-13-79, P. Block 1).

(4)Shutdown APU (Ref. 49-00-00, P. Block 501).

(5)Remove ground interphone equipment.

(6)Remove warning notice and close access door 136AR if open during engine run.

(7)For extended inactive periods after the engine is sufficiently cooled, install inlet and exhaust covers.

(8)Close variable bypass valves (VBV) doors (Ref. 75-32-01, P. Block 501).

(9)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).

10. Power Plant Operation (Cold Weather)

A. General

(1) This procedure gives the instructions necessary for the operation of the engine in cold weather conditions. These instructions have information, techniques, and additional procedures to operate the engine as necessary in cold weather.

(2) Make sure you use the inlet and exhaust covers to help prevent damage to the engine during cold weather operation. This is to make sure that free ice has not locked the rotors before you try to start the engine. It also prevents the collection of ice and snow in the engine inlet cowl and exhaust area.

(3) Ice that occurs in the engine inlet is one of the hazards during cold weather operation. Snow that blows can turn into ice when it enters a cool engine, then melts and freezes again. This ice can lock the rotor blades and cause a possible unbalance in the engine rotor system.

(4) Engine inlet ice can also occur on an engine in operation because of large airflows and section at the engine inlet. This is very hazardous when the engine is at high power under static conditions on the ground. Suction action decreases air pressure with a decrease in air temperature. This evaporative-cooling causes ice to occur when water drops hit the fan blades, guide-vanes, and spinner.

(5) To keep snow or rain out of the engine, install the inlet and fan exhaust covers as soon as possible. Install the turbine exhaust covers as soon as the engine cool down permits. It is recommended that the aircraft be pointed into the wind when parked for an extended time.

(6) Make sure you shutdown the engine in forward thrust during a heavy snowstorm. This will help prevent ice on the thrust-reverser cascade vanes, blocker doors, and linkages.

(7) Jet engines usually do not need to be preheated and starts can be done by the usual start procedures. It is possible that preheat will be necessary for the conditions that follow:

- to heat the oil tank up to -40°C (-40°F) when engine oil class B (type 2) are used and after a cold soaking longer than 5 hours at -54°C (-65.2°F) external temperature (oil class A (type 1) are qualified up to -54°C (-65.2°F).
- to free ice locked rotors
- to lower oil viscosity.
- for snow and ice removal from the cowling and thrust-reverser external surfaces and joints
- for ice removal from acoustic panels of the inlet cowl, fan and turbine exhaust ducts.

(8) Engine icing can occur during operation with visible moisture and the outside air temperature is below 46°F (8°C).

NOTE : Visible moisture is fog with a visibility of 1 mile (1.6 km) or less, rain or snow.

B. Equipment and Materials

NOTE : Equivalent replacements are permitted for the items that follow :

ITEM	DESIGNATION
(1)	Heater, Herman Nelson BT-400 or equivalent
(2)	Cover, engine inlet
(3)	Covers, engine exhaust fan and turbine

C. Procedure for Cold Weather Operation

(1)Prepare the engine for usual operation as specified in Paragraph 7., and do as follows :

CAUTION : DO NOT USE MORE THAN 350 LBF.FT (47.45 M.DAN) OF TORQUE ON THE ROTOR. IF THE ROTOR CANNOT TURN, THE FAN BLADES CAN BEND. THIS CAN CAUSE DAMAGE TO THE ENGINE COMPONENTS.

(a)Make sure the rotor is free to turn. Use a wooden stick or rod of other material that will not damage the fan blades. Rotate the rotor counterclockwise as seen from the front of the engine.

(b)If you cannot turn the rotor, install a turbine exhaust cover, and attach a hot air duct from the heater. Apply heat until the rotor turns freely.

(c)If necessary, examine the N2 rotor to see if it is free to turn by manual rotation (Ref. Paragraph 12).

(d)Apply heat if snow or ice makes it hard to open the following panels :
- fan-cowl doors
- core-cowl doors
- fan-duct cowls
- thrust-reverser.

(e)Use an air hose to remove the melted snow and ice from the exterior cowl joints before the cowl panels are opened.

(f)Examine all sumps and strainers in the fuel system for water or ice. If ice is in the system, apply heat 250°F (121°C) maximum at the drain area until water is removed from the fuel.

NOTE : If the fuel will flow freely from the drain cocks in the tank sumps and strainers, the system is free of ice.

(g)If type 2 oils are used, when oil temperature is below -40°C (-40°F) after a 5 hours cold soaking at -54°C (-65.2°F) external temperature, apply 70°C (158°F) hot air during 30 min. at oil tank and accessory gearbox through the oil filler door.

(h)Fuel components that have Fluorocarbon (Viton) external seals (SB 73-079) can leak for a short period of time when they are below -29°F (-34°C). If a leak occurs, continue the start to idle.
- If the fuel leakage stops in less than 5 minutes at idle, continue operation of the engine.
- If the fuel leakage continues after 5 minutes at idle, shut down the engine and repair the source of the leakage.

D. Operate the Engine

(1)Do the prestart procedure described for usual engine operation (Ref. Paragraph 9.).

CAUTION : DO NOT CONTINUE TO OPERATE AN ENGINE IF IT HAS BEEN IN LOW TEMPERATURES FOR A LONG TIME. IF FUEL AND OIL PRESSURES ARE LOWER THAN THE USUAL OPERATION LIMITS, DO THE ENGINE SHUTDOWN

PROCEDURES IMMEDIATELY. THIS WILL HELP PREVENT DAMAGE TO THE ENGINE.

CAUTION : MAKE SURE YOU DO A SYSTEMS CHECK FOR SIGNS OF ICE AFTER ENGINE SHUTDOWN. IF THERE ARE SIGNS OF ICE, REMOVE THE ICE BEFORE AN ENGINE START IS TRIED AGAIN. ICE IN THE FUEL AND OIL SYSTEMS CAN CAUSE A HUNG START OR UNSATISFACTORY LUBRICATION OF THE ENGINE.

CAUTION : PUT ICE CHOCKS AND A HIGH GROSS WEIGHT ON THE MAIN LANDING GEAR WHEELS. THIS WILL KEEP THE AIRCRAFT IN POSITION. IF THE AIRCRAFT IS PARKED ON ICE OR PACKED SNOW, USE A GROUND LOW-PRESSURE AIR SUPPLY UNIT OR THE APU TO START THE ENGINE. ASYMMETRICAL THRUST FROM THE ENGINES DURING CROSS STARTS CAN CAUSE THE AIRCRAFT TO TURN.

(2)Start the engine as specified for usual engine operation in Paragraph 9., and do as follows :

(a)Look for a drop in pressure on the DUCT PRESSURE indicator while you try to start the engine. If there is no indication, do a check for a frozen solenoid in the starter control valve. If the solenoid is frozen, free the starter valve as follows :

1 Free the starter valve with the manual starter valve override, square receptacle, on the starter valve during an engine start.

2 Free the pylon valve or high pressure bleed valve with heat 250°F (121°C) maximum.

(b)If a single igniter start causes problems, use both igniters during the next start.

(c)If the engine is slow to accelerate after lightup, shut down the engine as specified. Also, if it is apparent that the engine is going to have a hung start, shut down the engine as specified in Paragraph 9.B. Start the engine again as specified in Paragraph 9. for usual operation.

(d)If the engine is slow to start, hangs up, or will not accelerate out of idle, shut down the engine. Do a check to find the cause.

CAUTION : DO NOT CONTINUE TO OPERATE THE ENGINE IF THERE IS NO SIGN OF OIL PRESSURE AT MINIMUM IDLE. IF THE PRESSURE DROPS TO ZERO AFTER THREE MINUTES OF GROUND OPERATION, DO THE ENGINE SHUTDOWN PROCEDURES. THEN DO A CHECK TO FIND THE CAUSE. THIS WILL HELP PREVENT DAMAGE TO THE ENGINE.

CAUTION : DO THE ENGINE SHUTDOWN PROCEDURES IF THE OIL PRESSURE STAYS AT MORE THAN THE MAXIMUM RANGE LIMIT AFTER THE OIL TEMPERATURE BECOMES STABLE. WHEN STARTS ARE DONE IN COLD CONDITIONS, THE OIL PRESSURE INCREASES TO A FULL PRESSURE INDICATION. THIS CAN OCCUR BECAUSE OF HIGH OIL VISCOSITY. MAKE SURE THE OIL PRESSURE DECREASES AS THE OIL TEMPERATURE INCREASES. IF THE PRESSURE DOES NOT DECREASE, DO A CHECK TO FIND THE CAUSE. THIS WILL HELP PREVENT UNSATISFACTORY LUBRICATION AND DAMAGE TO THE ENGINE.

(e)If the engine was in subzero temperatures for a long time, operation at idle for three minutes is sufficient for warm up.

(f)Allow the IDG generator frequency to become stable before large electrical loads are applied.

NOTE : It is usually not necessary to heat the IDG. However, cold oil in the IDG will make the generator slow to come up to stable

power. One minute of operation is usually sufficient to warm up the IDG.

(3)Operate the engine as specified for usual engine operation in Paragraph 9., and do as follows :

NOTE : During engine operation in icing conditions, ice can build up on the spinner, fan blades, and the first stage vanes. This ice will regularly come off and will go through the fan exhaust.

(a)After one hour for engine operation at minimum idle, in icing conditions, do as follows :

1 Adjust the forward thrust lever to get 60% N1 rpm for 30 seconds maximum, then set to minimum idle.

2 If operation at minimum idle is continued, do the procedure again at one hour intervals to remove ice.

NOTE : Operation at minimum idle in icing conditions is permitted up to one hour without the ice removal procedure. Do the acceleration procedure after one hour to remove any collected ice.

CAUTION : MAKE SURE YOU OPERATE THE ENGINE AT A LOW POWER SETTING WHEN YOU REMOVE A LARGE QUANTITY OF ICE FROM THE INLET COWL. OPERATE THE ENGINE AT APPROXIMATELY 80-85% N2 RPM WITH THE NACELLE ANTI-ICING ON UNTIL ALL ICE IS REMOVED. THIS WILL HELP KEEP ENGINE DAMAGE TO A MINIMUM IF LARGE PIECES OF ICE GO INTO THE ENGINE.

(b)Remove the ice from the engine inlet cowl. Use the nacelle anti-icing system before the quantity becomes too large.

(c)When icing conditions are possible, reduce the power setting and turn on the nacelle anti-icing system. Increase the power setting only after you are sure that the ice has been removed.

(d)In subzero temperature, during wing anti-icing, operation as follows may be necessary :

1 Operation at 65-70% N2 rpm will be necessary to get bleed air with temperature high enough to cycle the overheat switches.

(4)Shut down the engine as specified for usual engine operation in Paragraph 9.B.

E. Put the Aircraft Back to Serviceable Condition

(1)Put the aircraft back to serviceable condition as specified in the usual engine operation (Ref. Paragraph 9.).

11.Adjustment/Test

A. Idle Adjustment/Test
The idle check consists in checking engine for proper operation as evidenced by leak-free connections, normal operating noise and proper indications on all engine related instruments. The visual leakage check is required if engine lines have been disconnected during maintenance action and not subsequently been statically pressure checked.

(1)Start up engine (Ref. para. 9.).

WARNING : ENGINE RUN UP WITH FAN REVERSER COWLS AND CORE COWLS OPEN IS PROHIBITED.
ENGINE RUN UP WITH FAN COWL OPEN AND SECURED BY HOLD OPEN ROD IS PROHIBITED AT POWER HIGHER THAN IDLE.

NOTE : Fuel components have Fluorocarbon (Viton) external seals (SB 73-079) can leak for a short period of time when they are below -29°F (-34°C). If a leak occurs, continue the start to idle.
- If the fuel leakage stops in less than 5 minutes at idle, continue operation of the engine.
- If the fuel leakage continues after 5 minutes at idle, shut down the engine and repair the source of the leakage.

Pre SB GE 73-036 *** (MAIN ENGINE CONTROLS WITH UNMODIFIED IDLE DESCENT SCHEDULE).

(2)Stabilize engine at Minimum Idle and make certain that the following are within limits (Ref. Fig. 515)

End Pre SB GE 73-036

Post SB GE 73-036 *** (MAIN ENGINE CONTROLS WITH MODIFIED REDUCED IDLE DESCENT SCHEDULE).

(2)Stabilize engine at Minimum Idle and make certain that the following are within limits (Ref. Fig. 516)

End Post SB GE 73-036

(a)Core engine speed (N2) for existing T2 and barometric pressure.

NOTE : Adjustment of N2 below 63.1 percent may be impossible since the MEC minimum physical speed limit is set at 62.3 ± 0.75 percent.
Adjustment to reduce idle speed should not be attempted when Minimum Idle N2 is within this range.

(b)Oil pressure.
(c)EGT, for ref. only : 220°-420°C (428°-788°F).
(d)For ref. only : Fan speed (N1) versus core speed (N2). (Ref. Fig. 514)

(3)Open circuit breaker ENGINES/ENG 1 & 2/IDLE/CTL/1KR.

(4)Stabilize at Approach Idle and make certain that the following requirements are within limits (Ref. Fig. 517).
(a)Core engine speed N2 for existing temperature T2 and barometric pressure Po (millibars).
(b)Oil pressure.
(c)EGT for Ref. only : 220°-420°C (428°-788°F).
(d)For ref. only : Fan speed (N1) versus core speed (N2). (Ref. Fig. 514)

IDLE SPEEDS

N2 (%)	N1 (%)	
NOMINAL	MINIMUM	MAXIMUM
58.0	17.6	29.7
58.5	17.6	29.8
59.0	17.7	29.8
59.5	17.7	29.9
60.0	17.8	29.9
60.5	17.9	30.0
61.0	18.0	30.2
61.5	18.2	30.3
62.0	18.3	30.5
62.5	18.5	30.6
63.0	18.7	30.8
63.5	18.9	31.1
64.0	19.2	31.3
64.5	19.4	31.6
65.0	19.7	31.8
65.5	20.0	32.1
66.0	20.3	32.4
66.5	20.7	32.8
67.0	21.0	33.1
67.5	21.4	33.5
68.0	21.8	33.9
68.5	22.2	34.3
69.0	22.6	34.8
69.5	23.1	35.2
70.0	23.6	35.7
70.5	24.1	36.2
71.0	24.6	36.7
71.5	25.1	37.3
72.0	25.7	37.8
72.5	26.3	38.4
73.0	26.8	39.0
73.5	27.5	39.6
74.0	28.1	40.2
74.5	28.8	40.9
75.0	29.4	41.6
75.5	30.1	42.3
76.0	30.8	43.0
76.5	31.6	43.7
77.0	32.3	44.5
77.5	33.1	45.2
78.0	33.9	46.0
78.5	34.7	46.8
79.0	35.5	47.7
79.5	36.4	48.5
80.0	37.3	49.4

BM5 71 00 00 5 LFM0 01

Fan Speed (N1) Versus Core Speed (N2)
Figure 514

(5)Shut down engine (Ref. para. 9.).
(6)Open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
(7)Visually inspect fuel, lube, and pneumatic lines, fittings, and accessories for leakage.
NOTE : An airbleed hole is provided for moisture drainage at 6:00 o'clock in CDP tube fitting of the MEC.
(8)Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).
(9)Close circuit breaker ENGINES/ENG 1 & 2/IDLE/CTL/1KR.

80C2

N2 MINIMUM IDLE SPEEDS (PCT)

******* BAROMETRIC PRESSURE PO (MILIBARS) *******

T2	760		790		820		850		880		910	
DEG C	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
-30.	62.6	65.6	61.7	64.7	61.6	63.8	61.6	63.3	61.6	63.1	61.6	63.1
-28.	62.8	65.8	61.9	64.9	61.6	64.1	61.6	63.4	61.6	63.1	61.6	63.1
-26.	63.1	66.1	62.2	65.2	61.6	64.3	61.6	63.5	61.6	63.1	61.6	63.1
-24.	63.3	66.3	62.4	65.4	61.6	64.5	61.6	63.7	61.6	63.1	61.6	63.1
-22.	63.5	66.5	62.7	65.7	61.8	64.8	61.6	63.9	61.6	63.2	61.6	63.1
-20.	63.8	66.8	62.9	65.9	62.0	65.0	61.6	64.1	61.6	63.4	61.6	63.1
-18.	64.0	67.0	63.1	66.1	62.2	65.2	61.6	64.3	61.6	63.6	61.6	63.1
-16.	64.3	67.3	63.4	66.4	62.5	65.5	61.6	64.6	61.6	63.7	61.6	63.1
-14.	64.5	67.5	63.6	66.6	62.7	65.7	61.8	64.8	61.6	64.0	61.6	63.3
-12.	64.8	67.8	63.8	66.8	62.9	65.9	62.0	65.0	61.6	64.2	61.6	63.5
-10.	65.0	68.0	64.1	67.11	63.2	66.2	62.2	65.2	61.6	64.4	61.6	63.7
- 8.	65.2	68.2	64.3	67.3	63.4	66.4	62.5	65.5	61.6	64.6	61.6	63.9
- 6.	65.5	68.5	64.5	67.5	63.6	66.6	62.7	65.7	61.8	64.8	61.6	64.1
- 4.	65.7	68.7	64.8	67.8	63.9	66.9	62.9	65.9	62.1	65.1	61.6	64.4
- 2.	65.9	68.9	65.0	68.0	64.1	67.1	63.2	66.2	62.3	65.3	61.6	64.6
0.	66.2	69.2	65.2	68.2	64.3	67.3	63.4	66.4	62.5	65.5	61.8	64.8
2.	66.4	69.4	65.5	68.5	64.5	67.5	63.6	66.6	62.7	65.7	62.0	65.0
4.	66.6	69.6	65.7	68.7	64.8	67.8	63.8	66.8	62.9	65.9	62.2	65.2
6.	66.9	69.9	65.9	68.9	65.0	68.0	64.0	67.0	63.2	66.2	62.4	65.4
8.	67.1	70.1	66.1	69.1	65.2	68.2	64.3	67.3	63.4	66.4	62.7	65.7
10.	67.3	70.3	66.4	69.4	65.4	68.4	64.5	67.5	63.6	66.6	62.9	65.9
12.	67.6	70.6	66.6	69.6	65.7	68.7	64.7	67.7	63.8	66.8	63.1	66.1
14.	68.0	71.0	66.9	69.9	65.9	68.9	64.9	67.9	64.0	67.0	63.3	66.3
16.	68.3	71.3	67.3	70.3	66.2	69.2	65.2	68.2	64.3	67.3	63.5	66.5
18.	68.6	71.6	67.6	70.6	66.5	69.5	65.5	68.5	64.5	67.5	63.7	66.7
20.	69.0	72.0	67.9	70.9	66.8	69.8	65.8	68.8	64.8	67.8	64.0	67.0
22.	69.3	72.3	68.2	71.2	67.1	70.1	66.1	69.1	65.1	68.1	64.3	67.3
24.	69.6	72.6	68.5	71.5	67.5	70.5	66.4	69.4	65.4	68.4	64.6	67.6
26.	69.9	72.9	68.8	71.8	67.8	70.8	66.7	69.7	65.7	68.7	64.8	67.8
28.	70.3	73.3	69.2	72.2	68.1	71.1	67.0	70.0	66.0	69.0	65.1	68.1
30.	70.6	73.6	69.5	72.5	68.4	71.4	67.3	70.3	66.3	69.3	65.4	68.4
32.	70.9	73.9	69.8	72.8	68.7	71.7	67.6	70.6	66.6	69.6	65.7	68.7
34.	71.2	74.2	70.1	73.1	69.0	72.0	67.9	70.9	66.9	69.9	66.0	69.0
36.	71.4	74.4	70.4	73.4	69.3	72.3	68.2	71.2	67.2	70.2	66.3	69.3
38.	71.7	74.7	70.6	73.6	69.6	72.6	68.5	71.5	67.4	70.4	66.5	69.5
40.	71.9	74.9	70.9	73.9	69.8	72.8	68.7	71.7	67.7	70.7	66.8	69.8

NOTE: Adjustment of N2 below 63.1 percent may be impossible since the MEC minimum physical speed limit is set at 62.3 + 0.75 percent. Adjustment to reduce idle speed should not be attempted when Minimum Idle N2 is within this range.

CF8-6897-02-A

BM5 71 00 00 5 LTMA -20 - 15
DM5

Minimum Idle (Pre SB GE 73-036) (Sheet 1/2)
Figure 515

N2 MINIMUM IDLE SPEEDS (PCT)

******* BAROMETRIC PRESSURE PO (MILIBARS) *******

T2	910		940		970		1000		1030		1060	
DEG C	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
-30.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-28.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-26.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-24.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-22.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-20.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-18.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-16.	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-14.	61.6	63.3	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-12.	61.6	63.5	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-10.	61.6	63.7	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
- 8.	61.6	63.9	61.6	63.3	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
- 6.	61.6	64.1	61.6	63.5	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
- 4.	61.6	64.4	61.6	63.7	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1
- 2.	61.6	64.6	61.6	63.9	61.6	63.3	61.6	63.1	61.6	63.1	61.6	63.1
0.	61.8	64.8	61.6	64.1	61.6	63.4	61.6	63.1	61.6	63.1	61.6	63.1
2.	62.0	65.0	61.6	64.3	61.6	63.6	61.6	63.2	61.6	63.1	61.6	63.1
4.	62.2	65.2	61.6	64.5	61.6	63.8	61.6	63.3	61.6	63.1	61.6	63.1
6.	62.4	65.4	61.7	64.7	61.6	64.0	61.6	63.5	61.6	63.1	61.6	63.1
8.	62.7	65.7	62.0	65.0	61.6	64.3	61.6	63.6	61.6	63.2	61.6	63.2
10.	62.9	65.9	62.2	65.2	61.6	64.5	61.6	63.9	61.6	63.4	61.6	63.4
12.	63.1	66.1	62.4	65.4	61.7	64.7	61.6	64.1	61.6	63.6	61.6	63.6
14.	63.3	66.3	62.6	65.6	61.9	64.9	61.6	64.3	61.6	63.9	61.6	63.9
16.	63.5	66.5	62.8	65.8	62.1	65.1	61.6	64.5	61.6	64.1	61.6	64.1
18.	63.7	66.7	63.0	66.0	62.3	65.3	61.7	64.7	61.6	64.3	61.6	64.3
20.	64.0	67.0	63.2	66.2	62.5	65.5	61.9	64.9	61.6	64.5	61.6	64.5
22.	64.3	67.3	63.5	66.5	62.7	65.7	62.1	65.1	61.7	64.7	61.7	64.7
24.	64.6	67.6	63.8	66.8	63.0	66.0	62.3	65.3	61.9	64.9	61.9	64.9
26.	64.8	67.8	64.0	67.0	63.3	66.3	62.6	65.6	62.1	65.1	62.1	65.1
28.	65.1	68.1	64.3	67.3	63.5	66.5	62.8	65.8	62.4	65.4	62.4	65.4
30.	65.4	68.4	64.6	67.6	63.8	66.8	63.1	66.1	62.6	65.6	62.6	65.6
32.	65.7	68.7	64.9	67.9	64.0	67.0	63.3	66.3	62.8	65.8	62.8	65.8
34.	66.0	69.0	65.1	68.1	64.3	67.3	63.6	66.6	63.1	66.1	63.1	66.1
36.	66.3	69.3	65.4	68.4	64.6	67.6	63.8	66.8	63.3	66.3	63.3	66.3
38.	66.5	69.5	65.7	68.7	64.8	67.8	64.1	67.1	63.6	66.6	63.6	66.6
40.	66.8	69.8	65.9	68.9	65.1	68.1	64.3	67.3	63.8	66.8	63.8	66.8

NOTE: Adjustment of N2 below 63.1 percent may be impossible since the MEC minimum physical speed limit is set at 62.3 + 0.75 percent. Adjustment to reduce idle speed should not be attempted when Minimum Idle N2 is within this range.

CF8-6898-02-A

BM5 71 00 00 5 LTMJ - 20 - 15
DM5

Minimum Idle (Pre SB GE 73-036) (Sheet 2/2)
Figure 515

80C2

N2 MINIMUM IDLE SPEEDS (PCT)

******* BAROMETRIC PRESSURE PO (MILLIBARS) *******

T2 DEG C	760 MIN	760 MAX	790 MIN	790 MAX	820 MIN	820 MAX	850 MIN	850 MAX	880 MIN	880 MAX	910 MIN	910 MAX
-30	61.6	63.6	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-28	61.6	63.8	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-26	61.6	64.0	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-24	61.6	64.3	61.6	63.4	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-22	61.6	64.5	61.6	63.7	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1
-20	61.8	64.8	61.6	63.9	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1
-18	62.1	65.1	61.6	64.1	61.6	63.3	61.6	63.1	61.6	63.1	61.6	63.1
-16	62.3	65.3	61.6	64.1	61.6	63.5	61.6	63.1	61.6	63.1	61.6	63.1
-14	62.5	65.5	61.6	64.6	61.6	63.7	61.6	63.2	61.6	63.1	61.6	63.1
-12	62.8	65.8	61.9	64.9	61.6	63.9	61.6	63.3	61.6	63.1	61.6	63.1
-10	63.0	66.0	62.1	65.1	61.6	64.2	61.6	63.4	61.6	63.1	61.6	63.1
-8	63.2	66.2	62.3	65.3	61.6	64.4	61.6	63.5	61.6	63.1	61.6	63.1
-6	63.4	66.4	62.6	65.6	61.6	64.6	61.6	63.7	61.6	63.2	61.6	63.1
-4	63.7	66.7	62.8	65.8	61.8	64.8	61.6	63.9	61.6	63.3	61.6	63.1
-2	63.9	66.9	63.0	66.0	62.1	65.1	61.6	64.1	61.6	63.4	61.6	63.1
0	64.2	67.2	63.2	66.2	62.3	65.3	61.6	64.4	61.6	63.5	61.6	63.1
2	64.4	67.4	63.5	66.5	62.5	65.5	61.6	64.6	61.6	63.8	61.6	63.2
4	64.7	67.7	63.7	66.7	62.7	65.7	61.8	64.8	61.6	64.0	61.6	63.4
6	64.9	67.9	63.9	66.9	62.9	65.9	62.0	65.0	61.6	64.2	61.6	63.5
8	65.1	68.1	64.1	67.1	63.2	66.2	62.3	65.3	61.6	64.4	61.6	63.6
10	65.4	68.4	64.4	67.4	63.4	66.4	62.5	65.5	61.7	64.7	61.6	63.9
12	65.7	68.7	64.7	67.7	63.7	66.7	62.8	65.8	61.9	64.9	61.6	64.1
14	66.0	69.0	65.0	68.0	64.0	67.0	63.0	66.0	62.2	65.2	61.6	64.4
16	66.3	69.3	65.3	68.3	64.3	67.3	63.3	66.3	62.4	65.4	61.6	64.6
18	66.6	69.6	65.6	68.6	64.6	67.6	63.6	66.6	62.7	65.7	61.9	64.9
20	66.9	69.9	66.0	69.0	64.9	67.9	63.9	66.9	63.0	66.0	62.1	65.1
22	67.3	70.3	66.3	69.3	65.2	68.2	64.1	67.1	63.2	66.2	62.4	65.4
24	67.6	70.6	66.6	69.6	65.5	68.5	64.4	67.4	63.5	66.5	62.6	65.6
26	67.9	70.9	66.9	69.9	65.8	68.8	64.7	67.7	63.8	66.8	62.9	65.9
28	68.2	71.2	67.2	70.2	66.1	69.1	65.0	68.0	64.0	67.0	63.2	66.2
30	68.4	71.4	67.4	70.4	66.3	69.3	65.3	68.3	64.3	67.3	63.4	66.4
32	68.7	71.7	67.7	70.7	66.6	69.6	65.5	68.5	64.6	67.6	63.7	66.7
34	69.0	72.0	68.0	71.0	66.9	69.9	65.8	68.8	64.9	67.9	64.0	67.0
36	69.2	72.2	68.2	71.2	67.2	70.2	66.1	69.1	65.1	68.1	64.3	67.3
38	69.5	72.5	68.5	71.5	67.4	70.4	66.4	69.4	65.4	68.4	64.6	67.6
40	69.8	72.8	68.7	71.7	67.7	70.7	66.7	69.7	65.7	68.7	64.8	67.8

NOTE: Adjustment of N2 below 63.1 PCT may be impossible since the MEC minimum physical speed limit is set at 62.3 +/- 0.75 PCT. Adjustment to reduce idle should not be attempted when Minimum Idle N2 is within this range.

1025199-03-A

Minimum Idle (Sheet 1/2)

BM5 71 00 00 5 LSMA - 00

Minimum Idle (Post SB GE 73-036) (Sheet 1/2)
Figure 516

80C2

N2 MINIMUM IDLE SPEEDS (PCT)

******* BAROMETRIC PRESSURE PO (MILLIBARS) *******

T2	910		940		970		1000		1030		1060	
DEG C	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
-30	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-28	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-26	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-24	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-22	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-20	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-18	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-16	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-14	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-12	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-10	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-8	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-6	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-4	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
-2	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
0	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
2	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
4	61.6	63.4	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
6	61.6	63.5	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
8	61.6	63.6	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
10	61.6	63.9	61.6	63.3	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
12	61.6	64.1	61.6	63.5	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
14	61.6	64.4	61.6	63.6	61.6	63.1	61.6	63.1	61.6	63.1	61.6	63.1
16	61.6	64.6	61.6	63.9	61.6	63.2	61.6	63.1	61.6	63.1	61.6	63.1
18	61.9	64.9	61.6	64.1	61.6	63.4	61.6	63.1	61.6	63.1	61.6	63.1
20	62.1	65.1	61.6	64.3	61.6	63.6	61.6	63.1	61.6	63.1	61.6	63.1
22	62.4	65.4	61.6	64.6	61.6	63.8	61.6	63.1	61.6	63.1	61.6	63.1
24	62.6	65.6	61.8	64.8	61.6	64.0	61.6	63.3	61.6	63.1	61.6	63.1
26	62.9	65.9	62.1	65.1	61.6	64.2	61.6	63.5	61.6	63.1	61.6	63.1
28	63.2	66.2	62.3	65.3	61.6	64.5	61.6	63.8	61.6	63.4	61.6	63.4
30	63.4	66.4	62.6	65.6	61.8	64.8	61.6	64.0	61.6	63.7	61.6	63.6
32	63.7	66.7	62.9	65.9	62.0	65.0	61.6	64.3	61.6	63.9	61.6	63.8
34	64.0	67.0	63.1	66.1	62.3	65.3	61.6	64.5	61.6	64.1	61.6	64.1
36	64.3	67.3	63.4	66.4	62.5	65.5	61.7	64.7	61.6	64.4	61.6	64.3
38	64.6	67.6	63.7	66.7	62.8	65.8	62.0	65.0	61.6	64.6	61.6	64.6
40	64.8	67.8	64.0	67.0	63.1	66.1	62.2	65.2	61.9	64.9	61.8	64.8

NOTE: Adjustment of N2 below 63.1 PCT may be impossible since the MEC minimum physical speed limit is set at 62.3 +/- 0.75 PCT. Adjustment to reduce idle should not be attempted when Minimum Idle N2 is within this range.

1025200-03-A

Minimum Idle (Sheet 2/2)

BM5 71 00 00 5 LSMJ-00

Minimum Idle (Post SB GE 73-036) (Sheet 2/2)
Figure 516

T2	********** BAROMETRIC PRESSURE PO (MILLIBARS) **********											
	760.		790.		820.		850.		880.		910.	
DEGC	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
-40.	65.6	68.6	65.0	68.0	64.4	67.4	64.0	67.0	63.8	66.8	63.6	66.6
-38.	65.9	68.9	65.3	68.3	64.7	67.7	64.3	67.3	64.1	67.1	63.9	66.9
-36.	66.2	69.2	65.6	68.6	64.9	67.9	64.6	67.6	64.4	67.4	64.2	67.2
-34.	66.4	69.4	65.8	68.8	65.2	68.2	64.9	67.9	64.6	67.6	64.5	67.5
-32.	66.7	69.7	66.1	69.1	65.5	68.5	65.1	68.1	64.9	67.9	64.7	67.7
-30.	67.0	70.0	66.4	69.4	65.8	68.8	65.4	68.4	65.2	68.2	65.0	68.0
-28.	67.3	70.3	66.7	69.7	66.0	69.0	65.7	68.7	65.5	68.5	65.3	68.3
-26.	67.5	70.5	66.9	69.9	66.3	69.3	65.9	68.9	65.7	68.7	65.5	68.5
-24.	67.8	70.8	67.2	70.2	66.5	69.5	66.2	69.2	66.0	69.0	65.8	68.8
-22.	68.0	71.0	67.4	70.4	66.8	69.8	66.4	69.4	66.2	69.2	66.1	69.1
-20.	68.3	71.3	67.7	70.7	67.1	70.1	66.7	69.7	66.5	69.5	66.3	69.3
-18.	68.5	71.5	67.9	70.9	67.3	70.3	67.0	70.0	66.7	69.7	66.6	69.6
-16.	68.8	71.8	68.2	71.2	67.6	70.6	67.2	70.2	67.0	70.0	66.8	69.8
-14.	69.1	72.1	68.4	71.4	67.8	70.8	67.5	70.5	67.3	70.3	67.1	70.1
-12.	69.3	72.3	68.7	71.7	68.1	71.1	67.7	70.7	67.5	70.5	67.3	70.3
-10.	69.6	72.6	69.0	72.0	68.3	71.3	68.0	71.0	67.8	70.8	67.6	70.6
-8.	69.8	72.8	69.2	72.2	68.6	71.6	68.2	71.2	68.0	71.0	67.9	70.9
-6.	70.1	73.1	69.5	72.5	68.8	71.8	68.5	71.5	68.3	71.3	68.1	71.1
-4.	70.3	73.3	69.7	72.7	69.1	72.1	68.7	71.7	68.5	71.5	68.3	71.3
-2.	70.6	73.6	69.9	72.9	69.3	72.3	69.0	72.0	68.8	71.8	68.6	71.6
0.	70.8	73.8	70.2	73.2	69.6	72.6	69.2	72.2	69.0	72.0	68.8	71.8
2.	71.0	74.0	70.4	73.4	69.8	72.8	69.4	72.4	69.2	72.2	69.1	72.1
4.	71.3	74.3	70.7	73.7	70.0	73.0	69.7	72.7	69.5	72.5	69.3	72.3
6.	71.5	74.5	70.9	73.9	70.3	73.3	69.9	72.9	69.7	72.7	69.5	72.5
8.	71.8	74.8	71.2	74.2	70.5	73.5	70.2	73.2	70.0	73.0	69.8	72.8
10.	72.0	75.0	71.4	74.4	70.8	73.8	70.4	73.4	70.2	73.2	70.1	73.1
12.	72.3	75.3	71.7	74.7	71.1	74.1	70.7	73.7	70.5	73.5	70.3	73.3
14.	72.5	75.5	71.9	74.9	71.3	74.3	71.0	74.0	70.7	73.7	70.6	73.6
16.	72.8	75.8	72.2	75.2	71.6	74.6	71.2	74.2	71.0	74.0	70.8	73.8
18.	73.1	76.1	72.5	75.5	71.8	74.8	71.5	74.5	71.3	74.3	71.1	74.1
20.	73.3	76.3	72.7	75.7	72.1	75.1	71.7	74.7	71.5	74.5	71.3	74.3
22.	73.6	76.6	73.0	76.0	72.3	75.3	72.0	75.0	71.8	74.8	71.6	74.6
24.	73.8	76.8	73.2	76.2	72.6	75.6	72.2	75.2	72.0	75.0	71.9	74.9
26.	74.1	77.1	73.5	76.5	72.9	75.9	72.5	75.5	72.3	75.3	72.1	75.1
28.	74.3	77.3	73.7	76.7	73.1	76.1	72.7	75.7	72.5	75.5	72.4	75.4
30.	74.6	77.6	74.0	77.0	73.3	76.3	73.0	76.0	72.8	75.8	72.6	75.6
32.	74.8	77.8	74.2	77.2	73.6	76.6	73.2	76.2	73.0	76.0	72.8	75.8
34.	75.0	78.0	74.4	77.4	73.8	76.8	73.5	76.5	73.2	76.2	73.1	76.1
36.	75.3	78.3	74.7	77.7	74.0	77.0	73.7	76.7	73.5	76.5	73.3	76.3
38.	75.5	78.5	74.9	77.9	74.3	77.3	73.9	76.9	73.7	76.7	73.5	76.5
40.	75.8	78.8	75.1	78.1	74.5	77.5	74.2	77.2	74.0	77.0	73.8	76.8
42.	76.0	79.0	75.4	78.4	74.8	77.8	74.4	77.4	74.2	77.2	74.0	77.0
44.	76.2	79.2	75.6	78.6	75.0	78.0	74.6	77.6	74.4	77.4	74.3	77.3
46.	76.5	79.5	75.9	78.9	75.2	78.2	74.9	77.9	74.7	77.7	74.5	77.5
48.	76.7	79.7	76.1	79.1	75.5	78.5	75.1	78.1	74.9	77.9	74.7	77.7

1025717-03-A

BM5 71 00 00 5 LGNA 02

Approach Idle Speed Limits (N2) for Engines
(Sheet 1/2)
Figure 517

T2	********** BAROMETRIC PRESSURE PO (MILLIBARS) **********											
	910.		940.		970.		1000.		1030.		1060.	
DEGC	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
-40.	63.6	66.6	63.5	66.5	63.3	66.3	63.1	66.1	62.9	65.9	62.8	65.8
-38.	63.9	66.9	63.7	66.7	63.6	66.6	63.4	66.4	63.2	66.2	63.0	66.0
-36.	64.2	67.2	64.0	67.0	63.8	66.8	63.7	66.7	63.5	66.5	63.3	66.3
-34.	64.5	67.5	64.3	67.3	64.1	67.1	63.9	66.9	63.8	66.8	63.6	66.6
-32.	64.7	67.7	64.6	67.6	64.4	67.4	64.2	67.2	64.0	67.0	63.9	66.9
-30.	65.0	68.0	64.8	67.8	64.7	67.7	64.5	67.5	64.3	67.3	64.1	67.1
-28.	65.3	68.3	65.1	68.1	64.9	67.9	64.8	67.8	64.6	67.6	64.4	67.4
-26.	65.5	68.5	65.4	68.4	65.2	68.2	65.0	68.0	64.8	67.8	64.7	67.7
-24.	65.8	68.8	65.6	68.6	65.4	68.4	65.3	68.3	65.1	68.1	64.9	67.9
-22.	66.1	69.1	65.9	68.9	65.7	68.7	65.5	68.5	65.3	68.3	65.2	68.2
-20.	66.3	69.3	66.1	69.1	66.0	69.0	65.8	68.8	65.6	68.6	65.4	68.4
-18.	66.6	69.6	66.4	69.4	66.2	69.2	66.0	69.0	65.9	68.9	65.7	68.7
-16.	66.8	69.8	66.6	69.6	66.5	69.5	66.3	69.3	66.1	69.1	65.9	68.9
-14.	67.1	70.1	66.9	69.9	66.7	69.7	66.6	69.6	66.4	69.4	66.2	69.2
-12.	67.3	70.3	67.2	70.2	67.0	70.0	66.8	69.8	66.6	69.6	66.5	69.5
-10.	67.6	70.6	67.4	70.4	67.2	70.2	67.1	70.1	66.9	69.9	66.7	69.7
-8.	67.9	70.9	67.7	70.7	67.5	70.5	67.3	70.3	67.1	70.1	67.0	70.0
-6.	68.1	71.1	67.9	70.9	67.7	70.7	67.6	70.6	67.4	70.4	67.2	70.2
-4.	68.3	71.3	68.2	71.2	68.0	71.0	67.8	70.8	67.6	70.6	67.5	70.5
-2.	68.6	71.6	68.4	71.4	68.2	71.2	68.0	71.0	67.9	70.9	67.7	70.7
0.	68.8	71.8	68.6	71.6	68.5	71.5	68.3	71.3	68.1	71.1	67.9	70.9
2.	69.1	72.1	68.9	71.9	68.7	71.7	68.5	71.5	68.3	71.3	68.2	71.2
4.	69.3	72.3	69.1	72.1	68.9	71.9	68.8	71.8	68.6	71.6	68.4	71.4
6.	69.5	72.5	69.4	72.4	69.2	72.2	69.0	72.0	68.8	71.8	68.7	71.7
8.	69.8	72.8	69.6	72.6	69.4	72.4	69.3	72.3	69.1	72.1	68.9	71.9
10.	70.1	73.1	69.9	72.9	69.7	72.7	69.5	72.5	69.4	72.4	69.2	72.2
12.	70.3	73.3	70.1	73.1	70.0	73.0	69.8	72.8	69.6	72.6	69.4	72.4
14.	70.6	73.6	70.4	73.4	70.2	73.2	70.0	73.0	69.9	72.9	69.7	72.7
16.	70.8	73.8	70.7	73.7	70.5	73.5	70.3	73.3	70.1	73.1	69.9	72.9
18.	71.1	74.1	70.9	73.9	70.7	73.7	70.6	73.6	70.4	73.4	70.2	73.2
20.	71.3	74.3	71.2	74.2	71.0	74.0	70.8	73.8	70.6	73.6	70.5	73.5
22.	71.6	74.6	71.4	74.4	71.2	74.2	71.1	74.1	70.9	73.9	70.7	73.7
24.	71.9	74.9	71.7	74.7	71.5	74.5	71.3	74.3	71.1	74.1	71.0	74.0
26.	72.1	75.1	71.9	74.9	71.8	74.8	71.6	74.6	71.4	74.4	71.2	74.2
28.	72.4	75.4	72.2	75.2	72.0	75.0	71.8	74.8	71.6	74.6	71.5	74.5
30.	72.6	75.6	72.4	75.4	72.2	75.2	72.1	75.1	71.9	74.9	71.7	74.7
32.	72.8	75.8	72.7	75.7	72.5	75.5	72.3	75.3	72.1	75.1	71.9	74.9
34.	73.1	76.1	72.9	75.9	72.7	75.7	72.5	75.5	72.4	75.4	72.2	75.2
36.	73.3	76.3	73.1	76.1	73.0	76.0	72.8	75.8	72.6	75.6	72.4	75.4
38.	73.5	76.5	73.4	76.4	73.2	76.2	73.0	76.0	72.8	75.8	72.7	75.7
40.	73.8	76.8	73.6	76.6	73.4	76.4	73.3	76.3	73.1	76.1	72.9	75.9
42.	74.0	77.0	73.8	76.8	73.7	76.7	73.5	76.5	73.3	76.3	73.1	76.1
44.	74.3	77.3	74.1	77.1	73.9	76.9	73.7	76.7	73.6	76.6	73.4	76.4
46.	74.5	77.5	74.3	77.3	74.1	77.1	74.0	77.0	73.8	76.8	73.6	76.6
48.	74.7	77.7	74.6	77.6	74.4	77.4	74.2	77.2	74.0	77.0	73.8	76.8

1025718-03-A

BM5 71 00 00 5 LGNJ 02

Approach Idle Speed Limits (N2) for Engines
(Sheet 2/2)
Figure 517

B. Operation Above Idle

Observe the following when operating the engine above idle :

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.)

CAUTION : RAPID ACCELS AND DECELS SHOULD BE AVOIDED TO PREVENT POSSIBILITY OF INTERNAL RUBS AND CONSEQUENT LOSS IN PERFORMANCE.

CAUTION : PMC MUST BE ACTIVATED. IF NOT, TAKE OFF THRUST MAY BE REACHED AT FAN RPM WELL BELOW MAXIMUM. CONSEQUENTLY, USE OF FULL THROTTLE WILL RESULT IN OVERTHRUSTING OF THE ENGINE WITH THE PROBABILITY OF SERIOUS OVERTEMPERATURES.

(1)Advance and retard throttle slowly.

(a)Monitor EGT. Reduce power as necessary to prevent EGT from exceeding limits.

(b)Monitor core engine speed (N2). Do not allow N2 to exceed 112.5 percent.

(c)Monitor oil pressure indications for 30-90 psig (2.10 - 6.32 bars) at MPA.

(2)Seal run-in

This procedure describes checks to run-in seals for engines having newly installed LPT shrouds, interstage seals, HPT interstage seals, or internal Compressor Discharge Pressure (CDP) and balance piston seals. Minor engine repair does not require run-in checks. This procedure will properly run-in the seals without damaging seal teeth or stationary seal surfaces.

NOTE : To reduce total running time, this procedure may be combined with the vibration check (Ref. 72-00-00, P. Block 501) VSV tracking check (Ref. B.5.).

CAUTION : NO RAPID ACCELS OR DECELS SHOULD BE MADE EXCEPT FOR EMERGENCIES OR AS SPECIFIED.

R (a)Obey the safety and operating precautions as described in Paragraph 3. (Ref. 71-00-00, P. Block 501).

R (b)Make sure that the wheel chocks CHOCK-MLG, ENGINE RUN-UP (98F10103500000) are in position in front of each forward MLG wheel.

R (c)There must be two qualified persons in the cockpit when performing an engine run above idle. One must monitor the outside and the aircraft behaviour while the other performs the engine test.

R (d)If the aircraft begins to move while performing an engine run, immediately set all the thrust engine test.

R (e)Start engine (Ref. Para.9.) and stabilize at Minimum Idle for 5 minutes.

R (f)Conduct a 2-minute accel to 83 % maximum power and stabilize for 3 minutes.

R (g)Conduct a 2-minute decel to Minimum Idle and stabilize for 5 minutes.

R (h)Shut down engine.

(3)Power assurance check.

(a)The function of the power assurance check is to make sure that the engine can go to takeoff power while the EGT and N2 speed stay in operation limits. Do this check after engine maintenance occurs that could change engine operation. This check compares engine performance to other power assurance runs. The difference in power assurance run data tells you if there are large changes in engine operation margin and if the margin where the engine operates is permitted. The check can also examine flight crew concerns.

(b)Because a power assurance run is usually not sufficiently stable, other quality check procedures can give a more accurate estimate of margin.
These other quality checks include a test stand run as given in the Engine Manual, and/or review of flight data received during takeoff and analysis done with algorithms from the OEM.

(c)Determine power assurance setting target N1 for 40 percent as follows :

1 Obtain and record accurate air temperature (T2).

NOTE : Use a thermometer placed in shade of nose wheel well or use aircraft total ambient temperature (TAT) system (if accurate). Avoid erroneous readings caused by re-circulating exhaust from ground carts, air conditioning packs, etc.

2 Determine target N1 for 40 percent at T2 temperature.
(Ref. Fig. 518)
(Ref. Fig. 519)

R (d)Obey the safety and operating precautions as described in Paragraph 3.
R (Ref. 71-00-00, P. Block 501).

R (e)Make sure that the wheel chocks CHOCK-MLG, ENGINE RUN-UP
R (98F10103500000) are in position in front of each forward MLG wheel.

R (f)There must be two qualified persons in the cockpit when performing an
R engine run above idle. One must monitor the outside and the aircraft
R behaviour while the other performs the engine test.

R (g)If the aircraft begins to move while performing an engine run,
R immediately set all the thrust engine test.

R (h)Start engine and stabilize at minimum idle for 5 minutes.

R (j)Setting of power assurance values

1 Place pneumatic supply and generator switches in OFF position.

2 Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
21VU	NAVIGATION/IRS2/115VAC	312FP2	105/E12
21VU	NAVIGATION/IRS2/BAT	313FP2	105/E13
21VU	ADS/ADC & ALPHA PROBES/TEST/PWR	28FL	105/E07
21VU	ADS/ADC & ALPHA PROBES/TEST/CTL	57FL	105/E06
21VU	ADS/F/O ALTM & VSI	24FL2	105/E11
21VU	ADS/ADC2/26VAC	8FL2	105/E09
21VU	ADS/ADC2/115VAC	9FL2	105/E10
22VU	ADS/ADC2/BARO SET	55FL1	208/B18
22VU	ADS/ADC1/115VAC	9FL1	208/B19
22VU	ADS/ADC1/26VAC	8FL1	208/B20

CF6-80C2A2

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-40	63.37	84.39	455	6,058	2748
-39	63.50	84.58	457	6,073	2755
-38	63.63	84.76	460	6,088	2761
-37	63.75	84.94	462	6,102	2768
-36	63.88	85.12	465	6,117	2775
-35	64.01	85.30	468	6,132	2781
-34	64.13	85.48	470	6,147	2788
-33	64.26	85.66	473	6,161	2795
-32	64.39	85.84	475	6,176	2801
-31	64.51	86.01	478	6,191	2808
-30	64.64	86.19	481	6,205	2815
-29	64.76	86.37	483	6,220	2821
-28	64.89	86.55	486	6,235	2828
-27	65.01	86.72	488	6,249	2835
-26	65.14	86.90	491	6,264	2841
-25	65.26	87.08	494	6,279	2848
-24	65.39	87.26	496	6,293	2855
-23	65.51	87.43	499	6,308	2861
-22	65.64	87.61	501	6,322	2868
-21	65.76	87.78	504	6,337	2874
-20	65.88	87.96	507	6,351	2881
-19	66.01	88.13	509	6,366	2887
-18	66.13	88.31	512	6,380	2894
-17	66.26	88.48	514	6,395	2901
-16	66.38	88.66	517	6,410	2907
-15	66.50	88.84	520	6,424	2914
-14	66.63	89.01	522	6,439	2921
-13	66.75	89.19	525	6,454	2927
-12	66.88	89.36	527	6,468	2934
-11	67.00	89.54	530	6,483	2941

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 247 LB/HR (112 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115680-02-A

BM5 71 00 00 5 LKMA 02

40 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 1/3)
Figure 518

CF6-80C2A2

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-10	67.12	89.71	532	6,497	2947
-9	67.25	89.88	535	6,512	2954
-8	67.37	90.06	538	6,527	2960
-7	67.49	90.23	540	6,541	2967
-6	67.61	90.41	543	6,556	2974
-5	67.74	90.58	545	6,570	2980
-4	67.86	90.75	548	6,585	2987
-3	67.98	90.93	550	6,599	2993
-2	68.11	91.10	553	6,614	3000
-1	68.23	91.27	555	6,629	3007
0	68.35	91.44	558	6,643	3013
1	68.47	91.62	561	6,658	3020
2	68.59	91.79	563	6,672	3026
3	68.71	91.96	566	6,686	3033
4	68.83	92.13	568	6,701	3039
5	68.96	92.30	571	6,715	3046
6	69.08	92.47	573	6,730	3053
7	69.20	92.65	576	6,745	3059
8	69.32	92.82	578	6,759	3066
9	69.44	92.99	581	6,774	3073
10	69.56	93.16	583	6,788	3079
11	69.69	93.33	586	6,803	3086
12	69.81	93.50	589	6,817	3092
13	69.93	93.67	591	6,832	3099
14	70.05	93.84	594	6,846	3106
15	70.17	94.01	596	6,861	3112
16	70.29	94.18	599	6,876	3119
17	70.41	94.36	601	6,891	3126
18	70.54	94.53	604	6,906	3132
19	70.66	94.70	606	6,921	3139

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 247 LB/HR (112 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115682-02-A

BM5 71 00 00 5 LKMJ 02

40 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 2/3)
Figure 518

CF6-80C2A2

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
20	70.78	94.88	609	6,936	3146
21	70.91	95.05	611	6,951	3153
22	71.03	95.22	614	6,966	3160
23	71.15	95.39	616	6,981	3166
24	71.28	95.57	619	6,996	3173
25	71.40	95.74	621	7,011	3180
26	71.52	95.91	624	7,026	3187
27	71.64	96.08	626	7,041	3194
28	71.76	96.25	629	7,055	3200
29	71.89	96.42	631	7,070	3207
30	72.01	96.60	634	7,085	3214
31	72.13	96.77	636	7,100	3221
32	72.25	96.94	639	7,115	3227
33	72.37	97.11	641	7,130	3234
34	72.49	97.28	644	7,145	3241
35	72.61	97.45	646	7,159	3247
36	72.73	97.62	649	7,174	3254
37	72.86	97.78	651	7,189	3261
38	72.98	97.96	653	7,204	3268
39	73.11	98.13	656	7,220	3275
40	73.23	98.31	658	7,236	3282
41	73.36	98.49	661	7,252	3290
42	73.49	98.67	663	7,268	3297
43	73.62	98.84	666	7,284	3304
44	73.75	99.02	668	7,300	3311
45	73.53	99.07	668	7,237	3283
46	73.32	99.11	668	7,174	3254
47	73.10	99.16	668	7,111	3225
48	72.89	99.21	668	7,048	3197
49	72.68	99.26	668	6,986	3169

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 247 LB/HR (112 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115683-02-A

BM5 71 00 00 5 LKMS 02

40 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 3/3)
Figure 518

CF6-80C2A8

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-40	63.37	84.01	443	5,964	2705
-39	63.50	84.19	446	5,978	2712
-38	63.63	84.37	448	5,993	2718
-37	63.75	84.55	451	6,008	2725
-36	63.88	84.73	454	6,022	2732
-35	64.01	84.91	456	6,037	2738
-34	64.13	85.09	459	6,051	2745
-33	64.26	85.26	461	6,066	2751
-32	64.39	85.44	464	6,080	2758
-31	64.51	85.62	466	6,095	2764
-30	64.64	85.80	469	6,109	2771
-29	64.76	85.97	472	6,123	2778
-28	64.89	86.15	474	6,138	2784
-27	65.01	86.33	477	6,152	2791
-26	65.14	86.50	479	6,167	2797
-25	65.26	86.68	482	6,181	2804
-24	65.39	86.86	484	6,195	2810
-23	65.51	87.03	487	6,210	2817
-22	65.64	87.21	489	6,224	2823
-21	65.76	87.38	492	6,238	2830
-20	65.88	87.55	495	6,252	2836
-19	66.01	87.73	497	6,267	2843
-18	66.13	87.90	500	6,281	2849
-17	66.26	88.08	502	6,295	2856
-16	66.38	88.25	505	6,310	2862
-15	66.50	88.43	507	6,324	2869
-14	66.63	88.60	510	6,339	2875
-13	66.75	88.78	512	6,353	2882
-12	66.88	88.95	515	6,368	2888
-11	67.00	89.13	517	6,382	2895

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 243 LB/HR (110 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1097256-04-A

BM5 71 00 00 5 LBMA 04

40 Percent Power Assurance Setting (CF6-80C2A8) (Sheet 1/3)
Figure 519

CF6-80C2A8

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-10	67.12	89.30	520	6,396	2901
-9	67.25	89.47	522	6,411	2908
-8	67.37	89.65	525	6,425	2914
-7	67.49	89.82	528	6,439	2921
-6	67.61	89.99	530	6,454	2927
-5	67.74	90.16	533	6,468	2934
-4	67.86	90.34	535	6,482	2940
-3	67.98	90.51	538	6,497	2947
-2	68.11	90.68	540	6,511	2953
-1	68.23	90.85	543	6,525	2960
0	68.35	91.02	545	6,540	2966
1	68.47	91.20	548	6,554	2973
2	68.59	91.37	550	6,568	2979
3	68.71	91.54	553	6,582	2986
4	68.83	91.71	555	6,597	2992
5	68.96	91.88	558	6,611	2999
6	69.08	92.05	560	6,625	3005
7	69.20	92.22	563	6,640	3012
8	69.32	92.39	565	6,654	3018
9	69.44	92.56	568	6,668	3025
10	69.56	92.73	570	6,683	3031
11	69.69	92.90	573	6,697	3038
12	69.81	93.07	575	6,711	3044
13	69.93	93.24	578	6,726	3051
14	70.05	93.41	580	6,740	3057
15	70.17	93.58	583	6,754	3064
16	70.29	93.75	585	6,769	3070
17	70.41	93.92	588	6,784	3077
18	70.54	94.10	590	6,798	3084
19	70.66	94.27	592	6,813	3090

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 243 LB/HR (110 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1097257-04-A

BM5 71 00 00 5 LBMJ 04

40 Percent Power Assurance Setting (CF6-80C2A8) (Sheet 2/3)
Figure 519

CF6-80C2A8

40% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
20	70.78	94.44	595	6,828	3097
21	70.91	94.61	597	6,843	3104
22	71.03	94.79	600	6,857	3110
23	71.15	94.96	602	6,872	3117
24	71.28	95.13	605	6,887	3124
25	71.40	95.30	607	6,902	3131
26	71.52	95.47	610	6,916	3137
27	71.64	95.64	612	6,931	3144
28	71.76	95.81	615	6,946	3151
29	71.89	95.98	617	6,960	3157
30	72.01	96.15	620	6,975	3164
31	72.13	96.32	622	6,990	3170
32	72.25	96.49	624	7,004	3177
33	72.37	96.66	627	7,019	3184
34	72.49	96.83	629	7,034	3190
35	72.61	97.00	632	7,048	3197
36	72.39	97.04	632	6,983	3167
37	72.16	97.07	632	6,918	3138
38	71.94	97.11	632	6,854	3109
39	71.73	97.16	632	6,791	3080
40	71.52	97.21	632	6,729	3052
41	71.31	97.26	632	6,666	3024
42	71.10	97.31	632	6,604	2996
43	70.89	97.35	632	6,542	2967
44	70.68	97.40	632	6,480	2939
45	70.48	97.45	632	6,418	2911
46	70.27	97.50	632	6,356	2883
47	70.06	97.55	632	6,296	2856
48	69.83	97.59	632	6,239	2830
49	69.61	97.63	632	6,183	2805

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 243 LB/HR (110 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1097258-04-A

BM5 71 00 00 5 LBMS 04

40 Percent Power Assurance Setting (CF6-80C2A8) (Sheet 3/3)
Figure 519

3 On ENG TRIM pushbutton switch select OFF.
WARNING : BEFORE STARTING ONE OR BOTH ENGINES ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.).
4 Slowly accel to setting previously determined for target N1 at T2 temperature.
5 Stabilize for minimum of 2 minutes ; then record average for each of the following : N1, N2, EGT, Baro, T2 and fuel flow.

R (k)Decel to Minimum Idle and stabilize for 5 minutes.

R (l)Shutdown engine.

R (m)Compare recorded data against the tolerances and limits as follows :
NOTE : Limits are based on achieving takeoff N1 without exceeding EGT or N2 with PMC in the disabled mode. Performing the same takeoff with PMC operating would result in additional margin of 4°C EGT.
1 Adjust parameters for deviations from actual N1 versus TARGET N1 per Note 4 of figure.
(Ref. Fig. 518)
(Ref. Fig. 519)
2 If adjusted values of EGT and N2 are in limits, there is assurance that the engine will be capable of achieving takeoff N1 without exceeding EGT or N2 limits. No other power assurance testing is necessary.
3 If adjusted values of the EGT and N2 fall out of the approved limits (particularly EGT), do the troubleshooting procedure.
NOTE : The fuel flow values listed in the Power Assurance charts are provided as expected range values only, and not to be considered as acceptance limits.
- If fault is corrected, repeat assurance check at the 40 percent setting.
- If data limits fail at the 40 percent, repeat assurance check at the 83 percent setting.
(Ref. Fig. 520)
(Ref. Fig. 521)
NOTE : Power checks at 83 percent should only be done if 40 percent settings have failed.
- if data fails out of the approved limits at the 83 percent power check point, the engine may be at the EGT or N2 limits at TAKE OFF power.

R (n)Place ENG TRIM, pneumatic supply and generator switches in ON position.

R (p)Close circuit breakers
on panel 21VU : 312FP2 ; 313FP2 ; 28FL ; 57FL ; 55FL1 ; 24FL2 ; 8FL2 ; 9FL2.
on panel 22VU : 9FL1 ; 8FL1.

CF6-80C2A2

83% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-40	87.35	93.76	639	14,841	6732
-39	87.53	93.96	643	14,878	6748
-38	87.71	94.16	646	14,914	6765
-37	87.88	94.36	649	14,951	6781
-36	88.06	94.56	652	14,987	6798
-35	88.23	94.76	656	15,023	6814
-34	88.41	94.96	659	15,059	6831
-33	88.58	95.16	662	15,095	6847
-32	88.76	95.36	666	15,131	6863
-31	88.93	95.56	669	15,167	6880
-30	89.10	95.76	672	15,203	6896
-29	89.28	95.95	676	15,239	6912
-28	89.45	96.15	679	15,275	6928
-27	89.62	96.35	682	15,311	6945
-26	89.79	96.54	685	15,346	6961
-25	89.97	96.74	689	15,382	6977
-24	90.14	96.94	692	15,418	6993
-23	90.31	97.13	695	15,454	7010
-22	90.48	97.33	698	15,489	7026
-21	90.65	97.52	702	15,525	7042
-20	90.82	97.72	705	15,560	7058
-19	90.99	97.91	708	15,596	7074
-18	91.16	98.11	711	15,631	7090
-17	91.33	98.30	715	16,667	7106
-16	91.50	98.50	718	15,703	7123
-15	91.68	98.69	721	15,739	7139
-14	91.85	98.89	724	15,775	7155
-13	92.02	99.08	728	15,811	7172
-12	92.19	99.28	731	15,847	7188
-11	92.36	99.47	734	15,882	7204

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 604 LB/HR (274 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115684-02-A

BM5 71 00 00 5 LEKA 02

83 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 1/3)
Figure 520

CF6-80C2A2

83% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-10	92.53	99.66	737	15,918	7220
-9	92.70	99.86	741	15,954	7237
-8	92.87	100.05	744	15,990	7253
-7	93.04	100.24	747	16,025	7269
-6	93.21	100.44	750	16,061	7285
-5	93.38	100.63	754	16,097	7301
-4	93.54	100.82	757	16,132	7318
-3	93.71	101.01	760	16,168	7334
-2	93.88	101.21	763	16,204	7350
-1	94.05	101.40	766	16,239	7366
0	94.22	101.59	770	16,275	7382
1	94.39	101.78	773	16,310	7398
2	94.55	101.97	776	16,346	7414
3	94.72	102.16	779	16,381	7430
4	94.89	102.35	783	16,417	7446
5	95.05	102.54	786	16,452	7463
6	95.22	102.73	789	16,488	7479
7	95.39	102.93	792	16,524	7495
8	95.56	103.12	795	16,560	7511
9	95.73	103.31	798	16,595	7528
10	95.89	103.50	802	16,631	7544
11	96.06	103.69	805	16,667	7560
12	96.23	103.88	808	16,702	7576
13	96.39	104.07	811	16,738	7592
14	96.56	104.25	814	16,773	7608
15	96.73	104.44	818	16,809	7624
16	96.89	104.63	821	16,845	7641
17	97.06	104.83	824	16,882	7657
18	97.23	105.02	827	16,919	7674
19	97.40	105.21	830	16,955	7691

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 604 LB/HR (274 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115685-02-A

BM5 71 00 00 5 LEKJ 02

83 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 2/3)
Figure 520

CF6-80C2A2

83% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
20	97.57	105.40	833	16,992	7708
21	97.74	105.60	837	17,029	7724
22	97.91	105.79	840	17,066	7741
23	98.08	105.98	843	17,102	7758
24	98.25	106.17	846	17,139	7774
25	98.42	106.36	849	17,176	7791
26	98.59	106.55	852	17,212	7807
27	98.76	106.74	855	17,249	7824
28	98.93	106.93	859	17,285	7840
29	99.09	107.12	862	17,322	7857
30	99.26	107.31	865	17,358	7874
31	99.43	107.50	868	17,395	7890
32	99.60	107.69	871	17,431	7907
33	99.76	107.88	874	17,467	7923
34	99.93	108.07	877	17,504	7940
35	100.10	108.26	881	17,540	7956
36	100.26	108.45	884	17,576	7973
37	100.43	108.63	887	17,613	7989
38	100.60	108.82	890	17,650	8006
39	100.77	109.02	893	17,689	8024
40	100.95	109.22	896	17,728	8041
41	101.13	109.42	899	17,767	8059
42	101.30	109.61	902	17,807	8077
43	101.48	109.81	905	17,846	8095
44	101.66	110.01	908	17,885	8113
45	101.49	110.07	908	17,737	8046
46	101.32	110.12	908	17,590	7979
47	101.16	110.18	908	17,443	7912
48	100.99	110.24	908	17,300	7847
49	100.83	110.30	908	17,164	7785

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 604 LB/HR (274 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1115686-02-A

BM5 71 00 00 5 LEKS 02

83 Percent Power Assurance Setting (CF6-80C2A2)
(Sheet 3/3)
Figure 520

CF6-80C2A8

83% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-40	87.35	93.49	626	14,631	6636
-39	87.53	93.69	629	14,667	6653
-38	87.71	93.89	632	14,702	6669
-37	87.88	94.09	636	14,738	6685
-36	88.06	94.29	639	14,774	6701
-35	88.23	94.49	642	14,810	6718
-34	88.41	94.69	645	14,845	6734
-33	88.58	94.89	649	14,881	6750
-32	88.76	95.08	652	14,916	6766
-31	88.93	95.28	655	14,952	6782
-30	89.10	95.48	658	14,987	6798
-29	89.28	95.68	662	15,022	6814
-28	89.45	95.87	665	15,058	6830
-27	89.62	96.07	668	15,093	6846
-26	89.79	96.27	671	15,128	6862
-25	89.97	96.46	674	15,164	6878
-24	90.14	96.66	678	15,199	6894
-23	90.31	96.85	681	15,234	6910
-22	90.48	97.05	684	15,269	6926
-21	90.65	97.24	687	15,304	6942
-20	90.82	97.44	691	15,339	6958
-19	90.99	97.63	694	15,374	6974
-18	91.16	97.82	697	15,409	6989
-17	91.33	98.02	700	15,444	7005
-16	91.50	98.21	703	15,480	7022
-15	91.68	98.41	707	15,515	7038
-14	91.85	98.60	710	15,551	7054
-13	92.02	98.80	713	15,586	7070
-12	92.19	98.99	716	15,622	7086
-11	92.36	99.18	719	15,657	7102

NOTES:

1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 596 LB/HR (270 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°C WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSTITVE (+).

1097259-04-A

BM5 71 00 00 5 LBNA 04

83 Percent Power Assurance Setting (CF6-80C2A8)
(Sheet 1/3)
Figure 521

CF6-80C2A8

83% POWER ASSURANCE SETTING

T2 °C	N1 % TARGET	N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
-10	92.53	99.38	723	15,692	7118
-9	92.70	99.57	726	15,727	7134
-8	92.87	99.76	729	15,762	7150
-7	93.04	99.96	732	15,798	7166
-6	93.21	100.15	735	15,833	7182
-5	93.38	100.34	738	15,868	7198
-4	93.54	100.53	742	15,903	7214
-3	93.71	100.72	745	15,938	7230
-2	93.88	100.92	748	15,974	7246
-1	94.05	101.11	751	16,009	7261
0	94.22	101.30	754	16,044	7277
1	94.39	101.49	757	16,079	7293
2	94.55	101.68	761	16,114	7309
3	94.72	101.87	764	16,149	7325
4	94.89	102.06	767	16,183	7341
5	95.05	102.25	770	16,219	7357
6	95.22	102.44	773	16,254	7373
7	95.39	102.63	776	16,289	7389
8	95.56	102.82	780	16,325	7405
9	95.73	103.01	783	16,360	7421
10	95.89	103.20	786	16,395	7437
11	96.06	103.39	789	16,430	7453
12	96.23	103.58	792	16,465	7468
13	96.39	103.77	795	16,500	7484
14	96.56	103.95	798	16,535	7500
15	96.73	104.14	802	16,570	7516
16	96.89	104.33	805	16,606	7532
17	97.06	104.53	808	16,642	7549
18	97.23	104.72	811	16,678	7565
19	97.40	104.91	814	16,715	7582

NOTES:
1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 596 LB/HR (270 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1°WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSITIVE (+).

1097260-04-A

BM5 71 00 00 5 LBNJ 04

83 Percent Power Assurance Setting (CF6-80C2A8)
(Sheet 2/3)
Figure 521

CF6-80C2A8

T2 °C	N1 % TARGET	83% POWER ASSURANCE SETTING N2 % MAX	EGT (°C) MAX	*WF (LB/HR) MAX	*WF (KG/HR) MAX
20	97.57	105.10	817	16,751	7598
21	97.74	105.29	820	16,787	7615
22	97.91	105.48	823	16,823	7631
23	98.08	105.67	826	16,860	7647
24	98.25	105.87	830	16,896	7664
25	98.42	106.06	833	16,932	7680
26	98.59	106.25	836	16,968	7696
27	98.76	106.44	839	17,004	7713
28	98.93	106.63	842	17,040	7729
29	99.09	106.82	845	17,076	7745
30	99.26	107.00	848	17,112	7762
31	99.43	107.19	851	17,148	7778
32	99.60	107.38	854	17,184	7794
33	99.76	107.57	857	17,219	7811
34	99.93	107.76	860	17,255	7827
35	100.10	107.95	864	17,291	7843
36	99.92	107.99	864	17,138	7774
37	99.74	108.04	864	16,986	7705
38	99.56	108.09	864	16,836	7637
39	99.40	108.15	864	16,698	7574
40	99.24	108.21	864	16,561	7512
41	99.08	108.28	864	16,423	7450
42	98.92	108.34	864	16,286	7387
43	98.76	108.40	864	16,150	7325
44	98.60	108.46	864	16,013	7264
45	98.45	108.52	864	15,877	7202
46	98.29	108.58	864	15,741	7140
47	98.13	108.65	864	15,605	7079
48	97.98	108.71	864	15,470	7017
49	97.83	108.77	864	15,336	6956

NOTES: 1. FIGURES VALID FOR SEA LEVEL TO 15000 FT STATIC.
2. FIGURES VALID ONLY WHEN GENERATOR AND PNEUMATIC SWITCHES ARE OFF.
3. *UP TO 8000 FT DECREASE WF BY 596 LB/HR (270 KG/HR) FOR EACH 1000 FT ABOVE SEA LEVEL. FOR ALTITUDES ABOVE 8000 FT, APPLY THE FACTORS THAT FOLLOW TO DECREASE THE WF VALUE:

ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR	ALTITUDE	FACTOR
9000 FT	0.715	11000 FT	0.662	13000 FT	0.612	15000 FT	0.565
10000 FT	0.688	12000 FT	0.636	14000 FT	0.588		

4. FOR EACH 0.1 % ACTUAL N1 DEVIATES FROM TARGET N1 ADJUST TARGET MAX VALUES AS FOLLOWS; N2: 0.05 % EGT: 1° WF: 30 LB/HR (14 KG/HR). IF ACTUAL N1 IS LESS THAN TARGET N1, ADJUSTMENTS ARE NEGATIVE (-). IF ACTUAL N1 IS GREATER THAN TARGET N1, ADJUSTMENTS ARE POSITIVE (+).

1097261-04-A

BM5 71 00 00 5 LBNS 04

83 Percent Power Assurance Setting (CF6-80C2A8)
(Sheet 3/3)
Figure 521

(4)Variable Stator Vanes (VSV) tracking check

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.).

NOTE : Omit step (a) below if aircraft is equipped so VSV position can be read by installed equipment.

(a)Install VSV position transducer 2C6451 on right side of engine (Ref. 77-31-08, P. Block 401).

(b)Check/Adjust VSV position transducer by using correction factor for each engine/system (Ref. 77-31-08, P. Block 501).

(c)VSV Idle Tracking Check (Ref. Fig. 525, 526)

NOTE : VSV tracking check position tables used will depend upon the main engine control (MEC) installed.
Check the part number on MEC to determine which configuration (Pre GE SB 73-014, MEC without bleed bias or GE SB 73-014, MEC with bleed bias) will be applicable.

1 Turn PMC to OFF position.

2 Start engine, stabilize at minimum idle for a minimum of five minutes. Record T2°C, N1%, N2% and VSV "actual" position (volts or degrees) on idle table of data sheet similar to figure (Ref. Fig. 522)

NOTE : The correction factor is only applicable to engines that are equipped with PMUX or aircraft equipped with AIDS internal wiring.
To obtain actual VSV position at minimum idle multiply VSV reading by correction calculated during LVDT calibration. (Ref. 77-31-08, P. Block 501).

(d)VSV Power Tracking Check

1 Determine power setting (N1%) for outside air temperature. (Ref. Fig. 524)

2 With PMC off, accelerate engine to 80 percent, N2 ± 0.4 percent and stabilize for a minimum of three minutes.

3 Accelerate to predetermined power setting (N1%) ± 0.5 percent and stabilize for a minimum of one minute. Record T2°C, N1%, N2% and VSV "actual" position (volts or degrees) at power setting on sample data sheet.

NOTE : The correction factor is only applicable to engines that are equipped with PMUX or aircraft equipped with AIDS internal wiring.
To obtain actual VSV position at power setting multiply VSV reading by correction factor calculated during LVDT calibration.

4 Decelerate to minimum idle and stabilize for five minutes.

5 Perform engine shut down.

(e)VSV Adjustment Calculations. (Ref. Fig. 522, 523)

1 Enter data recorded during VSV tracking checks on sample data sheet.

2 Compute VSV adjustment calculations using data recorded on sample data sheet at minimum idle and power settings as follows :

- Calculate corrected fan temperature T25 as follows : (Ref. Fig. 527)
  . At recorded fan speed (N1%) read temperature rise correction factor "delta T25°C". Record as "delta T" on sample data sheet.

. Add fan temperature T2°C to "delta T25" giving corrected fan temperature T25. Record as T25.

- Calculate corrected core speed N2K as follows : (Ref. Fig. 528)
  . At T25, obtain the core speed correction factor (square root of theta 25). Record correction factor.
  . Divide physical core speed N2 by core speed correction factor giving corrected core speed N2K. Record N2K.
  . Repeat above step setting 2 for VSV's power

3 Verify that VSV position is within limits. If not, proceed with optimum rig procedure (Ref. paragraph 10.B.(4)(f)).

NOTE : The VSV schedule varies depending on type of MEC installed. Main engine controls prior to introduction of bleed bias (Pre GE SB 73-014) or MEC's incorporating bleed bias (Post GE SB 73-014).

Pre GE SB 73-014*** (ENGINES WITHOUT MEC BLEED BIAS)

- (Ref. Fig. 529) for MEC's not incorporating bleed bias to verify VSV position schedule.

End Pre GE SB 73-014

GE SB 73-014*** (ENGINES USING MEC BLEED BIAS)

- (Ref. Fig. 530) for MEC's incorporating bleed bias

End GE SB 73-014

4 If installed, remove VSV Position Readout, 2C14232, and VSV position transducer.

Pre GE SB 73-014*** (ENGINES WITHOUT MEC BLEED BIAS)

(f)VSV optimum rigging.

NOTE : Optimum rigging varies depending on type of MEC installed. Main engine controls prior to introduction of "bleed bias" (Pre GE SB 73-014) or MEC incorporating "bleed bias" (Post GE SB 73-014).

1 Calculate amount of VSV adjustment at idle as follows :

- At N2K value, read NOM OPT (nominal optimization) value in either degrees or volts. Record
- Algebraically subtract the VSV ACTUAL from NOM OPT giving plus or minus CALC DIFF (amount of VSV adjustment). Record.
- Circle "OPEN" and "CCW" if amount of VSV adjustment is negative or if positive, circle "CLOSED" and "CW".

2 Calculate projected VSV at power setting to insure that the VSV adjustment at minimum idle will keep the VSV's within limits.

- Determine projected VSV at power setting by adding algebraically the power VSV ACTUAL to idle CALC DIFF. Record in power table. Projected VSV at N2K power should be within VSV limits.

NOTE : If projected VSV at power is out of limits, adjust the VSV's only the amount that is required to keep the VSV's at power within limits and still maintain the VSV's at idle within or close as possible to the idle optimum band.

- Using CALC DIFF and keeping the plus/minus convention, calculate the number of flats required. Record as ADJ IN FLATS. (Ref. Fig. 531).

3 Loosen lockscrew on VSV trimmer bracket. (Ref. Fig. 532).

4 Adjust by turning the VSV trimmer screw the required number of flats

where 1 turn equals 6 flats as follows :
- If amount of flat adjustment is positive, adjust trimmer screw clock-wise the number of flat-turns specified to increase voltage/ degree and to close the variable stator vanes.
- If amount of flat adjustment is negative, adjust trimmer screw counterclockwise the number of flat-turns specified to decrease voltage/degree and to open the variable stator vanes.

5 TORQUE lockscrew on VSV trimmer bracket to between 32 and 35 lbf.in. (0.36 and 0.40 m.daN.)

End Pre GE SB 73-014

GE SB 73-014*** (ENGINES WITH MEC BLEED BIAS)

(f)VSV optimum rigging.

1 calculate amount of VSV adjustment at power as follows :
- At N2K value, read NOM OPT (nominal optimization) value in either volts or degrees. Record.
- Algebraically subtract the ACTUAL VSV from NOM OPT giving plus or minus CALC DIFF (amount of VSV adjustment). Record.
- Circle "OPEN" and "CCW" if amount of VSV adjustment is negative or if positive, circle "CLOSED" and "CW".

2 Calculate projected VSV at idle setting to insure that the VSV adjustment at power will keep the VSV's within limits.
- Determine projected VSV at idle setting by adding algebraically the idle ACTUAL VSV to CALC DIFF from power table. Record. Projected VSV at idle should be within idle VSV limits.

NOTE : If projected VSV at idle is out of limits, adjust the VSV's only the amount that is required to keep the VSV's at idle within limits and still maintain the VSV's at power within or close as possible to the power optimum band.

Using value of CALC DIFF and keeping the plus/minus convention, calculate the number of flats required. Record as ADJ IN FLATS. (Ref. Fig. 531)

3 Loosen lockscrew on VSV trimmer bracket (Ref. Fig. 532)

4 Adjust by turning the VSV trimmer screw the required number of flats where 1 turn equals 6 flats as follow :
- If amount of flat adjustment is positive, adjust trimmer screw clockwise the number of flat-turns specified to increase voltage/ degree and to close the variable stator vanes.
- If amount of flat adjustment is negative, adjust trimmer screw counterclockwise the number of flat-turns specified to decrease voltage/degree and to open the variable stator vanes.

5 TORQUE lockscrew on VSV trimmer bracket to between 32 and 35 lbf.in. (0.36 and 0.40 m.daN).

End GE SB 73-014

(g)Adjust MEC adjustable rig plate to align rig marks using the hydraulic actuator, 2C6395, as follows :

CAUTION : DO NOT EXCEED 300 PSIG (20.68 BARS) SUPPLY PRESSURE.

1 Disconnect VSV head-end and rod-end hoses at the main engine control. Cap the MEC fittings.

2 Connect the hydraulic actuator lines to the VSV actuator head-end and rod-end hoses which were disconnected from the MEC.

3 Actuate VSV's open (actuator rod extended) by applying and maintai-

ning hydraulic medium (C02-023 or C04-002) at a pressure of 200-300 psig (13.80-20.68 bars) to VSV actuator head-end.

4 Loosen two screws on MEC securing the rig plate.

5 Adjust the rig plate until the rig mark aligns itself with the rig pointer while applying 17.5 ± 1.0 lbf. (7.9 ± 0.5 Kg) in direction shown.

6 Secure the rig plate with two attaching screws. TORQUE screws to between 11 and 13 lbf.in. (0.12 and 0.15 m.daN).

7 Recheck rig mark alignment while applying a force of 17.5 ± 1.0 lbf. (7.9 ± 0.5 Kg).

8 Relieve all pressure and disconnect the hydraulic actuator from the VSV rod-end and head-end hoses.

9 Connect VSV head-end and rod-end hoses to the MEC fittings. TORQUE VSV head-end hose to between 650 and 770 lbf.in. (7.34 and 8.70 m.daN) and TORQUE rod-end hose to between 450 and 550 lbf.in. (5.08 and 6.21 m.daN).

(5)Specific gravity adjustment.

The specific gravity adjustment consists of adjust/check specific gravity settings on the MEC when a new or overhauled engine is installed or replaced. A normal setting for Jet A, Jet A1, Jet B, JP-1, JP-4 and JP-5 is 0.82. For adjustment procedures refer to 73-21-01, P. Block 501.

80C2 (W/O BLEED BIAS) VSV OPTIMIZATION

A. VSV'S AT IDLE (N2K CALCULATION AND VSV CONVERSION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL				DEG VOLT	
CORRECTION FACTOR (FROM FIG.)		(+) △T	(÷) $\sqrt{\theta 25}$	(X) *	
CALCULATE TOTALS		(=) T25	(=) N2K	(=) →	(=) DEG VOLT

B. VSV ADJUSTMENT CALCULATIONS AT IDLE

NOM OPT (FROM FIG.)	RECORD ACTUAL VSV	CALC DIFF (ALGEBRAIC SUM)	ADJ IN FLATS (FROM FIG.)
DEG VOLT	(−) DEG VOLT	(=) OPEN CLOSED	CW CCW

C. VSV'S AT POWER (N2K CALCULATION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL				DEG VOLT	
CORRECTION FACTOR		(+) △T	(÷) $\sqrt{\theta 25}$	(X) *	
CALCULATE TOTALS		(=) T25	(=) N2K	(=) →	(=) DEG VOLT

D. PROJECTED VSV'S AT POWER (ADJUSTMENT CALCULATION)

ACTUAL VSV		DEG VOLT
CALC DIFF FROM IDLE (OBSERVE SIGN CONVENTION)		(+) DEG VOLT
PROJECTED VSV AT POWER (ALGEBRAIC SUM)		(=) DEG VOLT
RECORD POWER VSV LIMITS (FROM FIG)	DEG VOLT	IN OUT

ENGINE SERIAL NO. _____
ENGINE MODEL _____

* INSERT VSV CORRECTION FACTOR, CALCULATED PER 77-31-08.

BM5 71 00 00 5 LPNO - 22 - 17
DM5

CF8-6986-03-A

Sample Data Sheet (For Engines Without MEC Bleed Bias)
Figure 522

80C2 (WITH BLEED BIAS) VSV OPTIMIZATION

A. VSV'S AT POWER (N2K CALCULATION AND VSV CONVERSION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL				DEG VOLT	
CORRECTION FACTOR (FROM FIG.)		(+) △T	(÷) $\sqrt{\theta 25}$	(X) *	
CALCULATE TOTALS		(=) T25	(=) N2K	(=) →	(=) DEG VOLT

B. VSV ADJUSTMENT CALCULATIONS AT POWER

NOM OPT (FROM FIG.)	RECORD ACTUAL VSV	CALC DIFF (ALGEBRAIC SUM)	ADJ IN FLATS (FROM FIG.)
DEG VOLT	(−) DEG VOLT	(=) OPEN CLOSED	CW CCW

C. VSV'S AT IDLE (N2K CALCULATION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL				DEG VOLT	
CORRECTION FACTOR		(+) △T	(÷) $\sqrt{\theta 25}$	(X) *	
CALCULATE TOTALS		(=) T25	(=) N2K	(=) →	(=) DEG VOLT

D. PROJECTED VSV'S AT IDLE (ADJUSTMENT CALCULATION)

ACTUAL VSV		DEG VOLT
CALC DIFF FROM POWER (OBSERVE SIGN CONVENTION)		(+) DEG VOLT
PROJECTED VSV AT IDLE (ALGEBRAIC SUM)		(=) DEG VOLT
RECORD IDLE VSV LIMITS (FROM FIG)	DEG VOLT	IN OUT

ENGINE SERIAL NO. _____
ENGINE MODEL _____

* INSERT VSV CORRECTION FACTOR, CALCULATED PER 77-31-08.

BM5 71 00 00 5 LPPO - 22 - 17
DM5

CF8-A6101-00-A

Sample Data Sheet (For Engines With MEC Bleed Bias)
Figure 523

80C2

T2 DEGC	N1 PCT	T2 DEGC	N1 PCT	T2 DEGC	N1 PCT
-40	86.8	-10	92.2	20	97.3
-39	87.0	-9	92.4	21	97.5
-38	87.2	-8	92.6	22	97.7
-37	87.4	-7	92.7	23	97.8
-36	87.5	-6	92.9	24	98.0
-35	87.7	-5	93.1	25	98.2
-34	87.9	-4	93.3	26	98.3
-33	88.1	-3	93.4	27	98.5
-32	88.3	-2	93.6	28	98.7
-31	88.5	-1	93.8	29	98.8
-30	88.6	0	94.0	30	99.0
-29	88.8	1	94.1	31	99.1
-28	89.0	2	94.3	32	99.3
-27	89.2	3	94.5	33	99.5
-26	89.4	4	94.6	34	99.6
-25	89.6	5	94.8	35	99.8
-24	89.7	6	95.0	36	100.0
-23	89.9	7	95.2	37	100.1
-22	90.1	8	95.3	38	100.3
-21	90.3	9	95.5	39	100.4
-20	90.4	10	95.7	40	100.6
-19	90.6	11	95.8	41	100.8
-18	90.8	12	96.0	42	100.9
-17	91.0	13	96.2	43	101.1
-16	91.2	14	96.3	44	101.2
-15	91.3	15	96.5	45	101.4
-14	91.5	16	96.7	46	101.6
-13	91.7	17	96.8	47	101.7
-12	91.9	18	97.0	48	101.9
-11	92.0	19	97.2	49	102.0
				50	102.2

CF8-6987-00-A

BM5 71 00 00 5 LONO - 18 - 13
DM5

Fan Temperature (T2) Versus Power Setting
Figure 524

80C2 (W/O BLEED BIAS) VSV OPTIMIZATION

A. VSV'S AT IDLE (N2K CALCULATION AND VSV CONVERSION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL	24.0	19.7	60.6	36.70 (DEG) VOLT	
CORRECTION FACTOR (FROM FIG.)		(+) 2.3 △T	(÷)1.0121 $\sqrt{\theta 25}$	(X) * 0.964	
CALCULATE TOTALS		(=) 22.0 T25	(=) 59.9 N2K	(=) →	(=) 35.40 (DEG) VOLT

B. VSV ADJUSTMENT CALCULATIONS AT IDLE

NOM OPT (FROM FIG.)	RECORD ACTUAL VSV	CALC DIFF (ALGEBRAIC SUM)	ADJ IN FLATS (FROM FIG.)
34.85 (DEG) VOLT	(−) 35.40 (DEG) VOLT	(=)-0.55 (OPEN) CLOSED	2 CW (CCW)

C. VSV'S AT POWER (N2K CALCULATION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL	97.0	19.7	101.3	6.30 (DEG) VOLT	
CORRECTION FACTOR (1)		(+) 82.0 △T	(÷)1.1406 $\sqrt{\theta 25}$	(X) * 0.964	
CALCULATE TOTALS		(=) 101.7 T25	(=) 88.8 N2K	(=) →	(=) 6.10 (DEG) VOLT

D. PROJECTED VSV'S AT POWER (ADJUSTMENT CALCULATION)

ACTUAL VSV		6.10 (DEG) VOLT
CALC DIFF FROM IDLE (OBSERVE SIGN CONVENTION)		(+)-0.55 (DEG) VOLT
PROJECTED VSV AT POWER (ALGEBRAIC SUM)		(=) 5.55 (DEG) VOLT
RECORD POWER VSV LIMITS (FROM FIG)	4.32-8.63 (DEG) VOLT	(IN) OUT

ENGINE SERIAL NO. _____
ENGINE MODEL _____

* VSV CORRECTION FACTOR, CALCULATED PER 77-31-08.

BM5 71 00 00 5 LRNO - 22 - 17
DM5

CF8-6988-04-A

Typical VSV Adjustment Calculation
(For Engines Without MEC Bleed Bias)
Figure 525

80C2 (WITH BLEED BIAS) VSV OPTIMIZATION

A. VSV'S AT POWER (N2K CALCULATION AND VSV CONVERSION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL	97.0	19.7	101.3	6.3 (DEG) VOLT	
CORRECTION FACTOR (FROM FIG.)		(+) 82.0 △T	(÷)1.1406 $\sqrt{\theta 25}$	(X) * 0.964	
CALCULATE TOTALS		(=) 101.7 T25	(=) 88.8 N2K	(=) →	(=) 6.1 (DEG) VOLT

B. VSV ADJUSTMENT CALCULATIONS AT POWER

NOM OPT (FROM FIG.)	RECORD ACTUAL VSV	CALC DIFF (ALGEBRAIC SUM)	ADJ IN FLATS (FROM FIG.)
8.4 (DEG) VOLT	(−) 6.1 (DEG) VOLT	(=) 2.3 OPEN (CLOSED)	10 (CW) CCW

C. VSV'S AT IDLE (N2K CALCULATION)

	N1 (%)	T2 (°C)	N2 (%)	VSV CORRECTION	ACTUAL VSV (CORRECTED)
RECORD ACTUAL	24.0	19.7	60.6	32.9 (DEG) VOLT	
CORRECTION FACTOR (1)		(+) 2.3 △T	(÷)1.0121 $\sqrt{\theta 25}$	(X) * 0.964	
CALCULATE TOTALS		(=) 22.0 T25	(=) 59.9 N2K	(=) →	(=) 31.7 (DEG) VOLT

D. PROJECTED VSV'S AT IDLE (ADJUSTMENT CALCULATION)

ACTUAL VSV		31.7 (DEG) VOLT
CALC DIFF FROM POWER (OBSERVE SIGN CONVENTION)		(+) 2.3 (DEG) VOLT
PROJECTED VSV AT IDLE (ALGEBRAIC SUM)		(=) 34.0 (DEG) VOLT
RECORD IDLE VSV LIMITS (FROM FIG)	31.30-34.60 (DEG) VOLT	(IN) OUT

ENGINE SERIAL NO. _____
ENGINE MODEL _____

* VSV CORRECTION FACTOR, CALCULATED PER 77-31-08.

BM5 71 00 00 5 LRPO - 22 - 17
DM5

CF8-A6102-00-A

Typical VSV Adjustment Calculation
(For Engines With MEC Bleed Bias)
Figure 526

80C2

TO DETERMINE T25: 1. READ ΔT25 FOR N1 PCT
2. T25 = T2 + ΔT25

N1 PCT	ΔT25 DEGC	ΔT25 DEGF	N1 PCT	ΔT25 DEGC	ΔT25 DEGF	N1 PCT	ΔT25 DEGC	ΔT25 DEGF
24	2.3	4.2	59	29.2	52.6	94	77.1	138.9
25	2.8	5.0	60	30.3	54.6	95	78.7	141.7
26	3.2	5.7	61	31.4	56.6	96	80.4	144.6
27	3.6	6.5	62	32.6	58.7	97	82.0	147.6
28	4.1	7.4	63	33.8	60.8	98	83.6	150.5
29	4.6	8.3	64	34.9	62.9	99	85.2	153.4
30	5.1	9.2	65	36.1	65.0	100	86.9	156.4
31	5.7	10.2	66	37.4	67.2	101	88.6	159.4
32	6.2	11.2	67	38.6	69.4	102	90.2	162.4
33	6.8	12.2	68	39.8	71.7	103	91.9	165.4
34	7.4	13.3	69	41.1	74.0	104	93.6	168.5
35	8.0	14.5	70	42.4	76.3	105	95.3	171.5
36	8.7	15.6	71	43.7	78.6	106	97.0	174.6
37	9.4	16.8	72	45.0	80.9	107	98.7	177.7
38	10.1	18.1	73	46.3	83.3	108	100.5	180.8
39	10.8	19.4	74	47.6	85.7	109	102.2	183.9
40	11.5	20.7	75	49.0	88.2	110	103.9	187.1
41	12.3	22.1	76	50.3	90.6	111	105.7	190.2
42	13.0	23.5	77	51.7	93.1	112	107.4	193.4
43	13.8	24.9	78	53.1	95.6	113	109.2	196.5
44	14.6	26.4	79	54.5	98.1	114	111.0	199.7
45	15.5	27.9	80	55.9	100.7	115	112.7	202.9
46	16.3	29.4	81	57.4	103.3	116	114.5	206.1
47	17.2	31.0	82	58.8	105.9	117	116.3	209.4
48	18.1	32.6	83	60.3	108.5	118	118.1	212.6
49	19.0	34.3	84	61.8	111.2	119	119.9	215.9
50	20.0	35.9	85	63.2	113.8	120	121.7	219.1
51	20.9	37.6	86	64.7	116.5	121	123.5	222.4
52	21.9	39.4	87	66.2	119.2	122	125.4	225.7
53	22.9	41.2	88	67.8	122.0	123	127.2	229.0
54	23.9	43.0	89	69.3	124.7	124	129.0	232.3
55	24.9	44.8	90	70.8	127.5	125	130.9	235.6
56	26.0	46.7	91	72.4	130.3	126	132.7	238.9
57	27.0	48.6	92	74.0	133.1	127	134.6	242.2
58	28.1	50.6	93	75.5	136.0	128	136.4	245.5

BM5 71 00 00 5 LSNO - 18 - 13
DM5

CF8-6989-00-A

Fan Temperature Rise
Figure 527

80C2

CORE SPEED CORRECTION FACTORS

T_{25} - °C	$\sqrt{\theta_{25}}$	T_{25} - °C	$\sqrt{\theta_{25}}$	T_{25} - °C	$\sqrt{\theta_{25}}$	T_{25} - °C	$\sqrt{\theta_{25}}$	T_{25} - °C	$\sqrt{\theta_{25}}$	T_{25} - °C	$\sqrt{\theta_{25}}$
-50	0.8800	-15	0.9465	20	1.0086	55	1.0672	90	1.1226	125	1.1755
-49	0.8820	-14	0.9483	21	1.0104	56	1.0688	91	1.1242	126	1.1770
-48	0.8840	-13	0.9502	22	1.0121	57	1.0704	92	1.1257	127	1.1784
-47	0.8859	-12	0.9520	23	1.0138	58	1.0720	93	1.1273	128	1.1799
-46	0.8879	-11	0.9538	24	1.0155	59	1.0736	94	1.1288	129	1.1814
-45	0.8898	-10	0.9556	25	1.0172	60	1.0753	95	1.1303	130	1.1828
-44	0.8918	- 9	0.9575	26	1.0189	61	1.0769	96	1.1319	131	1.1843
-43	0.8937	- 8	0.9593	27	1.0206	62	1.0785	97	1.1334	132	1.1858
-42	0.8957	- 7	0.9611	28	1.0223	63	1.0801	98	1.1349	133	1.1872
-41	0.8976	- 6	0.9629	29	1.0240	64	1.0817	99	1.1365	134	1.1887
-40	0.8995	- 5	0.9647	30	1.0257	65	1.0833	100	1.1380	135	1.1902
-39	0.9014	- 4	0.9665	31	1.0274	66	1.0849	101	1.1395	136	1.1916
-38	0.9034	- 3	0.9683	32	1.0291	67	1.0865	102	1.1410	137	1.1931
-37	0.9053	- 2	0.9701	33	1.0308	68	1.0881	103	1.1425	138	1.1945
-36	0.9072	- 1	0.9718	34	1.0324	69	1.0897	104	1.1441	139	1.1960
-35	0.9091	0	0.9736	35	1.0341	70	1.0913	105	1.1456	140	1.1974
-34	0.9110	1	0.9754	36	1.0358	71	1.0929	106	1.1471	141	1.1989
-33	0.9129	2	0.9772	37	1.0375	72	1.0945	107	1.1486	142	1.2003
-32	0.9148	3	0.9790	38	1.0391	73	1.0960	108	1.1501	143	1.2018
-31	0.9167	4	0.9807	39	1.0408	74	1.0976	109	1.1516	144	1.2032
-30	0.9186	5	0.9825	40	1.0425	75	1.0992	110	1.1531	145	1.2046
-29	0.9205	6	0.9843	41	1.0441	76	1.1008	111	1.1546	146	1.2061
-28	0.9224	7	0.9860	42	1.0458	77	1.1024	112	1.1561	147	1.2075
-27	0.9243	8	0.9878	43	1.0475	78	1.1039	113	1.1576	148	1.2090
-26	0.9261	9	0.9895	44	1.0491	79	1.1055	114	1.1591	149	1.2104
-25	0.9280	10	0.9913	45	1.0508	80	1.1071	115	1.1606	150	1.2119
-24	0.9299	11	0.9930	46	1.0524	81	1.1086	116	1.1621		
-23	0.9317	12	0.9948	47	1.0541	82	1.1102	117	1.1636		
-22	0.9336	13	0.9965	48	1.0557	83	1.1118	118	1.1651		
-21	0.9355	14	0.9983	49	1.0574	84	1.1133	119	1.1666		
-20	0.9373	15	1.0000	50	1.0590	85	1.1149	120	1.1681		
-19	0.9392	16	1.0017	51	1.0606	86	1.1164	121	1.1696		
-18	0.9410	17	1.0035	52	1.0623	87	1.1180	122	1.1710		
-17	0.9428	18	1.0052	53	1.0639	88	1.1195	123	1.1725		
-16	0.9447	19	1.0069	54	1.0655	89	1.1211	124	1.1740		

BM5 71 00 00 5 LTNO - 18 - 13
DM5

CF8-6990-00A

Core Speed Correction Factors
Figure 528

VSV POSITION TABLE IN VOLTS (W/O BLEED BIAS)

CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED	OPT +0.050 -0.00	CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED	CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED
50.5	4.10	4.40	4.300	68.0	3.72	4.01	85.5	1.53	2.03
51.0	4.09	4.39	4.290	68.5	3.70	4.01	86.0	1.46	1.95
51.5	4.08	4.38	4.280	69.0	3.68	4.00	86.5	1.39	1.87
52.0	4.07	4.37	4.270	69.5	3.66	3.97	87.0	1.32	1.79
52.5	4.06	4.36	4.260	70.0	3.64	3.95	87.5	1.25	1.70
53.0	4.05	4.35	4.250	70.5	3.61	3.93	88.0	1.18	1.62
53.5	4.04	4.34	4.240	71.0	3.57	3.91	88.5	1.10	1.54
54.0	4.03	4.32	4.230	71.5	3.53	3.89	89.0	1.03	1.45
54.5	4.02	4.31	4.220	72.0	3.49	3.86	89.5	0.96	1.36
55.0	4.01	4.30	4.210	72.5	3.43	3.81	90.0	0.89	1.28
55.5	4.00	4.29	4.200	73.0	3.36	3.74	90.5	0.82	1.20
56.0	3.99	4.28	4.190	73.5	3.29	3.67	91.0	0.75	1.11
56.5	3.98	4.27	4.180	74.0	3.22	3.60	91.5	0.68	1.02
57.0	3.97	4.26	4.170	74.5	3.14	3.53	92.0	0.63	0.96
57.5	3.96	4.25	4.160	75.0	3.07	3.47	92.5	0.60	0.92
58.0	3.95	4.24	4.150	75.5	2.99	3.41	93.0	0.58	0.88
58.5	3.94	4.23	4.140	76.0	2.92	3.34	93.5	0.56	0.85
59.0	3.92	4.22	4.120	76.5	2.84	3.28	94.0	0.55	0.82
59.5	3.91	4.21	4.110	77.0	2.76	3.21	94.5	0.54	0.80
60.0	3.90	4.20	4.100	77.5	2.69	3.15	95.0	0.54	0.78
60.5	3.89	4.19	4.090	78.0	2.61	3.08	95.5	0.53	0.77
61.0	3.88	4.18	4.080	78.5	2.53	3.02	96.0	0.53	0.76
61.5	3.87	4.17	4.070	79.0	2.45	2.95	96.5	0.53	0.75
62.0	3.86	4.16	4.060	79.5	2.38	2.88	97.0	0.53	0.74
62.5	3.85	4.15	4.050	80.0	2.30	2.82	97.5	0.53	0.74
63.0	3.84	4.14	4.030	80.5	2.23	2.75	98.0	0.53	0.74
63.5	3.83	4.13	4.030	81.0	2.16	2.68	98.5	0.53	0.74
64.0	3.82	4.12	4.020	81.5	2.08	2.61	99.0	0.53	0.74
64.5	3.81	4.11	4.010	82.0	2.01	2.54	99.5	0.53	0.74
65.0	3.81	4.10	4.000	82.5	1.94	2.47			
65.5	3.80	4.09	3.990	83.0	1.88	2.40			
66.0	3.79	4.08	3.980	83.5	1.81	2.33			
66.5	3.77	4.07	3.970	84.0	1.74	2.26			
67.0	3.75	4.05	3.950	84.5	1.67	2.18			
67.5	3.74	4.04	3.940	85.0	1.60	2.11			

BM5 71 00 00 5 LUNA - 22 - 17
DM5

CF8-6991-03-A

VSV Position (Volts) For Engines
Without MEC Bleed Bias (Sheet 1/2)
Figure 529

R

VSV POSITION TABLE IN DEGREES (W/O BLEED BIAS)

CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED	OPT +0.50 -0.00	CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED	CORRECTED CORE SPEED	LIMITS OPEN	LIMITS CLOSED
50.5	35.34	38.31	37.32	68.0	31.43	34.46	85.5	9.06	14.26
51.0	35.27	38.27	37.29	68.5	31.26	34.38	86.0	8.37	13.44
51.5	35.17	38.17	37.17	69.0	31.07	34.27	86.5	7.70	12.60
52.0	35.06	38.06	37.06	69.5	30.87	34.05	87.0	6.99	11.75
52.5	34.95	37.95	39.95	70.0	30.61	33.83	87.5	6.27	10.89
53.0	34.84	37.84	36.84	70.5	30.30	33.62	88.0	5.53	10.04
53.5	34.73	37.73	36.73	71.0	29.95	33.40	88.5	4.77	9.17
54.0	34.63	37.63	36.63	71.5	29.55	33.14	89.0	4.03	8.27
54.5	34.52	37.52	36.52	72.0	29.11	32.84	89.5	3.29	7.38
55.0	34.41	37.41	36.41	72.5	28.55	32.35	90.0	2.57	6.54
55.5	34.30	37.30	36.30	73.0	27.83	31.67	90.5	1.85	5.69
56.0	34.19	37.19	36.19	73.5	27.06	30.94	91.0	1.11	4.80
56.5	34.09	37.09	36.09	74.0	26.31	30.21	91.5	0.42	3.93
57.0	33.98	36.98	35.98	74.5	25.56	29.56	92.0	-0.08	3.31
57.5	33.87	36.87	35.87	75.0	24.81	28.91	92.5	-0.41	2.85
58.0	33.76	36.76	35.76	75.5	24.02	28.26	93.0	-0.63	2.48
58.5	33.65	36.65	35.65	76.0	23.25	27.62	93.5	-0.78	2.16
59.0	33.54	36.54	35.54	76.5	22.47	26.96	94.0	-0.89	1.88
59.5	33.44	36.44	35.44	77.0	21.68	26.29	94.5	-0.96	1.66
60.0	33.33	36.33	35.33	77.5	20.90	25.62	95.0	-1.01	1.46
60.5	33.22	36.22	35.22	78.0	20.11	24.96	95.5	-1.05	1.33
61.0	33.11	36.11	35.11	78.5	19.32	24.29	96.0	-1.08	1.21
61.5	33.01	36.01	35.01	79.0	18.54	23.61	96.5	-1.10	1.12
62.0	32.91	35.91	34.91	79.5	17.76	22.93	97.0	-1.10	1.10
62.5	32.82	35.82	34.82	80.0	17.01	22.24	97.5	-1.10	1.10
63.0	32.72	35.72	34.72	80.5	16.26	21.54	98.0	-1.10	1.10
63.5	32.62	35.62	34.62	81.0	15.50	20.84	98.5	-1.10	1.10
64.0	32.52	35.52	34.52	81.5	14.75	20.14	99.0	-1.10	1.10
64.5	32.42	35.42	34.42	82.0	14.04	19.44			
65.0	32.32	35.32	34.32	82.5	13.34	18.74			
65.5	32.23	35.23	34.23	83.0	12.64	18.04			
66.0	32.13	35.13	34.13	83.5	11.92	17.30			
66.5	31.97	35.00	33.98	84.0	11.20	16.54			
67.0	31.80	34.86	33.83	84.5	10.51	15.79			
67.5	31.61	34.73	33.67	85.0	9.80	15.03			

CF8-6992-03-A

VSV Position (Degrees) For Engines
Without MEC Bleed Bias (Sheet 2/2)
Figure 529

R

VSV POSITION TABLE IN VOLTS (WITH BLEED BIAS)

CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	OPTIMUM ±0.050
50.5	4.03	4.28	68.0	3.47	3.88	85.5	1.74	2.25	2.00
51.0	4.05	4.31	68.5	3.45	3.86	86.0	1.68	2.18	1.93
51.5	4.03	4.29	69.0	3.43	3.84	86.5	1.61	2.10	1.86
52.0	4.01	4.27	69.5	3.40	3.82	87.0	1.54	2.01	1.77
52.5	4.00	4.25	70.0	3.37	3.80	87.5	1.47	1.92	1.69
53.0	3.98	4.23	70.5	3.34	3.78	88.0	1.39	1.83	1.61
53.5	3.96	4.21	71.0	3.31	3.75	88.5	1.31	1.74	1.52
54.0	3.94	4.19	71.5	3.28	3.73	89.0	1.23	1.65	1.44
54.5	3.92	4.18	72.0	3.25	3.72	89.5	1.15	1.55	1.35
55.0	3.89	4.16	72.5	3.21	3.69	90.0	1.07	1.46	1.26
55.5	3.88	4.15	73.0	3.18	3.65	90.5	1.00	1.37	1.18
56.0	3.86	4.13	73.5	3.14	3.62	91.0	0.94	1.30	1.12
56.5	3.84	4.12	74.0	3.08	3.57	91.5	0.88	1.23	1.06
57.0	3.82	4.11	74.5	3.04	3.53	92.0	0.83	1.17	1.00
57.5	3.80	4.09	75.0	2.99	3.50	92.5	0.78	1.10	0.94
58.0	3.78	4.07	75.5	2.95	3.46	93.0	0.74	1.05	0.90
58.5	3.76	4.06	76.0	2.90	3.41	93.5	0.70	1.00	0.85
59.0	3.74	4.05	76.5	2.86	3.37	94.0	0.68	0.96	0.82
59.5	3.73	4.04	77.0	2.80	3.31	94.5	0.66	0.92	0.79
60.0	3.71	4.03	77.5	2.75	3.26	95.0	0.64	0.88	0.76
60.5	3.69	4.02	78.0	2.69	3.21	95.5	0.61	0.85	0.73
61.0	3.67	4.00	78.5	2.64	3.16	96.0	0.59	0.82	0.71
61.5	3.66	4.00	79.0	2.58	3.10	96.5	0.57	0.79	0.68
62.0	3.65	3.99	79.5	2.52	3.04	97.0	0.56	0.77	0.66
62.5	3.64	3.99	80.0	2.46	2.98	97.5	0.54	0.76	0.65
63.0	3.62	3.98	80.5	2.39	2.92				
63.5	3.61	3.97	81.0	2.33	2.86				
64.0	3.59	3.96	81.5	2.27	2.80				
64.5	3.58	3.95	82.0	2.20	2.73				
65.0	3.57	3.94	82.5	2.14	2.66				
65.5	3.55	3.93	83.0	2.07	2.59				
66.0	3.53	3.92	83.5	2.00	2.52				
66.5	3.52	3.91	84.0	1.94	2.46				
67.0	3.50	3.89	84.5	1.88	2.39				
67.5	3.49	3.89	85.0	1.81	2.32				

BM5 71 00 00 5 LUPA - 22 - 17
DM5

CF8-A6103-00-A

VSV Position (Volts) For Engines
With MEC Bleed Bias (Sheet 1/2)
Figure 530

R

VSV POSITION TABLE IN DEGREES (WITH BLEED BIAS)

CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	CORRECTED CORE SPEED ($N2/\sqrt{\theta 25}$)	LIMITS OPEN	LIMITS CLOSE	OPTIMUM ±0.50
50.5	34.64	37.21	68.0	28.90	33.10	85.5	11.28	16.46	13.87
51.0	34.86	37.46	68.5	28.69	32.89	86.0	10.60	15.69	13.15
51.5	34.65	37.25	69.0	28.47	32.67	86.5	9.92	14.93	12.43
52.0	34.45	37.05	69.5	28.23	32.46	87.0	9.19	14.01	11.60
52.5	34.28	36.88	70.0	27.90	32.30	87.5	8.46	13.09	10.78
53.0	34.09	36.69	70.5	27.57	32.09	88.0	7.65	12.18	9.92
53.5	33.88	36.48	71.0	27.23	31.81	88.5	6.82	11.26	9.04
54.0	33.67	36.27	71.5	26.93	31.60	89.0	6.01	10.30	8.16
54.5	33.45	36.10	72.0	26.65	31.43	89.5	5.22	9.32	7.27
55.0	33.24	35.93	72.5	26.29	31.12	90.0	4.43	8.36	6.40
55.5	33.06	35.79	73.0	25.90	30.77	90.5	3.66	7.45	5.56
56.0	32.88	35.66	73.5	25.49	30.41	91.0	3.09	6.73	4.91
56.5	32.70	35.53	74.0	24.97	29.94	91.5	2.52	6.02	4.27
57.0	32.53	35.39	74.5	24.47	29.53	92.0	1.98	5.39	3.69
57.5	32.32	35.25	75.0	24.00	29.18	92.5	1.45	4.76	3.11
58.0	32.06	35.07	75.5	23.56	28.76	93.0	1.05	4.22	2.64
58.5	31.88	34.94	76.0	23.12	28.32	93.5	0.65	3.67	2.16
59.0	31.70	34.80	76.5	22.65	27.85	94.0	0.43	3.26	1.85
59.5	31.51	34.70	77.0	22.09	27.29	94.5	0.23	2.87	1.55
60.0	31.32	34.61	77.5	21.52	26.72	95.0	-0.01	2.51	1.25
60.5	31.13	34.47	78.0	20.96	26.21	95.5	-0.26	2.16	0.95
61.0	30.94	34.33	78.5	20.41	25.71	96.0	-0.47	1.85	0.69
61.5	30.82	34.26	79.0	19.86	25.16	96.5	-0.67	1.55	0.44
62.0	30.73	34.21	79.5	19.24	24.56	97.0	-0.83	1.37	0.27
62.5	30.59	34.16	80.0	18.57	23.93	97.5	-0.98	1.22	0.12
63.0	30.45	34.12	80.5	17.90	23.30				
63.5	30.30	34.03	81.0	17.27	22.67				
64.0	30.15	33.93	81.5	16.63	22.03				
64.5	30.03	33.83	82.0	15.99	21.33				
65.0	29.93	33.73	82.5	15.33	20.63				
65.5	29.75	33.62	83.0	14.63	19.93				
66.0	29.54	33.52	83.5	13.94	19.24				
66.5	29.38	33.38	84.0	13.31	18.57				
67.0	29.22	33.22	84.5	12.69	17.91				
67.5	29.06	33.15	85.0	12.00	17.20				

CF8-A6104-00-A

VSV Position (Degrees) For Engines
With MEC Bleed Bias (Sheet 2/2)
Figure 530

R

80C2

VSV ADJUSTMENT IN FLATS

FLATS	VOLTS	DEGREES	FLATS	VOLTS	DEGREES
14	0.32	3.31	7	0.16	1.65
13	0.30	3.07	6	0.14	1.42
12	0.28	2.83	5	0.12	1.18
11	0.26	2.60	4	0.09	0.95
10	0.23	2.36	3	0.07	0.71
9	0.21	2.13	2	0.05	0.47
8	0.19	1.89	1	0.02	0.24

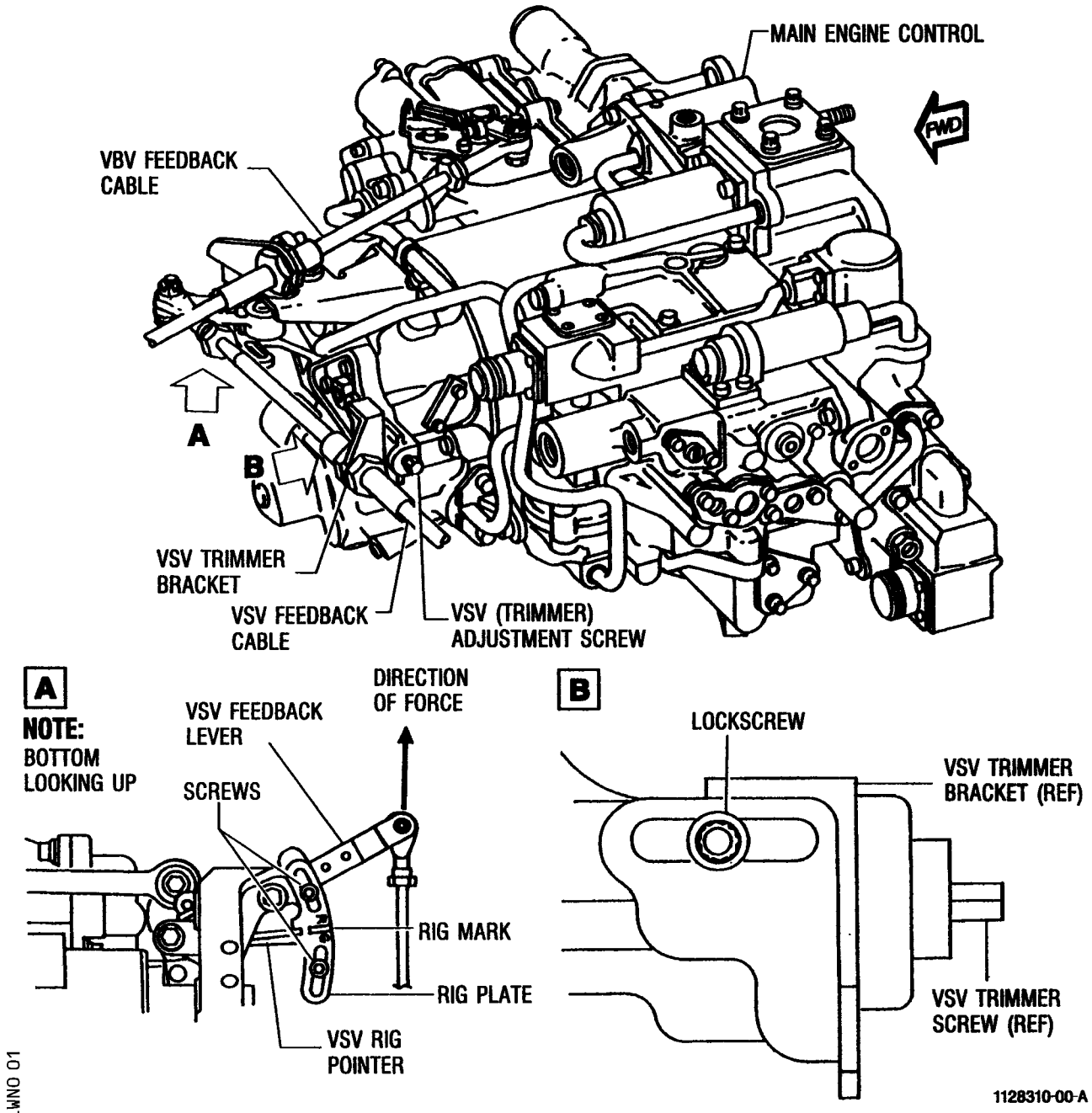
NOTE:

ONE TURN = 6 FLATS = 1.42 DEGREES = 0.14 VOLTS,
TURNING TRIMMER SCREW CW (+) CLOSES VSV'S AND INCREASES VOLTAGE/DEGREE UNITS OR CCW (-) OPENS VSV'S AND DECREASES VOLTAGE/DEGREE UNITS.

CF8-6993-00-C

BM5 71 00 00 5 LVNO - 18 - 13
DM5

Number of Flats Versus Amount of VSV Adjustment
Figure 531



BM5 71 00 00 5 LWNO 01

VSV Rigging
Figure 532

(6)Power management control (PMC) system operational checkout

(a)General

This check contains procedures to operationally checkout the Power Management Control (PMC) system, including the associated hardware (sensors, cables, MEC, etc.) and the PMC.

(b)Operational checkout

NOTE : This procedure may be combined with any of the other tests.

1 Start the Engine (Ref. Para. 9) and stabilize at Minimum Idle for 5 minutes minimum.

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.).

2 With PMC set to OFF, conduct a slow accel (1-minute minimum) to target N1 for T2 (Ref. Fig. 533). Record N1.

3 Set PMC to ON. After stabilization, verify that N1 has decreased. (Ref. Fig. 533)

4 Make a slow decel (1-minute minimum) to Minimum Idle ; stabilize 5 minutes minimum.

5 Perform other required tests or engine shutdown (Ref. Para. 9).

T^2 Deg C	N_1(%) Target	N_1(%) Decrease Min	Max	T^2 Deg C	N_1(%) Target	N_1(%) Decrease Min	Max	T^2 Deg C	N_1(%) Target	N_1(%) Decrease Min	Max
-40	82.3	11.7	18.0	-10	87.4	7.0	12.7	20	92.3	2.2	7.4
-38	82.6	11.3	17.6	- 8	87.7	6.7	12.4	22	92.6	1.8	7.1
-36	83.0	11.0	17.2	- 6	88.1	6.3	12.0	24	92.9	1.4	6.8
-34	83.3	10.7	16.8	- 4	88.4	5.9	11.8	26	93.2	1.4	6.8
-32	83.7	10.4	16.4	- 2	88.7	5.6	11.4	28	93.5	1.8	7.1
-30	84.0	10.1	16.0	0	89.1	5.3	11.0	30	93.8	2.2	7.4
-28	84.4	9.8	15.7	2	89.4	5.0	10.7	32	94.1	2.5	7.6
-26	84.7	9.5	15.3	4	89.7	4.7	10.3	34	94.4	2.8	7.8
-24	85.0	9.2	14.9	6	90.0	4.4	10.0	36	94.7	3.1	8.3
-22	85.4	8.9	14.6	8	90.3	4.1	9.7	38	95.0	3.5	8.4
-20	85.7	8.6	14.3	10	90.7	3.8	9.3	40	95.3	3.8	8.6
-18	86.1	8.3	14.0	12	91.0	3.5	8.9	42	95.7	4.1	8.9
-16	86.4	7.9	13.6	14	91.3	3.1	8.5	44	96.0	4.4	9.1
-14	86.7	7.6	13.3	16	91.6	2.8	8.1	46	96.3	4.7	9.3
-12	87.1	7.3	13.0	18	91.9	2.5	7.7	48	96.7	5.0	9.7
								50	96.9	5.3	10.0

CF8-6901-01-A

Power Management Control System Operation Check
Figure 533

C. Accel Check (optional)

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTIONS MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.).

(1)Perform engine test

(a)Accel check procedure

This procedure permits engine testing to demonstrate capability of the engine to properly accel. The accel time is listed as "normal time", this is not stated as limit due to the complexity of actual timing, setting points and power extraction etc.

The procedure is written to perform the check with the PMC "ON". An alternate procedure is also given which is applicable if PMC is inoperative.

1 Place engine trim pushbutton select switch "ON".

CAUTION : SELECTION OF PMC SWITCH "OFF" SHOULD BE PERFORMED ONLY AT IDLE THRUST UNLESS OTHERWISE SPECIFIED. PMC SWITCH "OFF" AT HIGHER THRUST SETTING COULD CAUSE OVERBOOST/OVERTEMPERATURE OF THE ENGINE.

R 2 Obey the safety and operating precautions as described in Paragraph 3.
R (Ref. 71-00-00, P. Block 501).
R 3 Make sure that the wheel chocks CHOCK-MLG, ENGINE RUN-UP
R (98F10103500000) are in position in front of each forward MLG wheel.
R 4 There must be two qualified persons in the cockpit when performing an
R engine run above idle. One must monitor the outside and the aircraft
R behaviour while the other performs the engine test.
R 5 If the aircraft begins to move while performing an engine run,
R immediately set all the thrust levers to idle position.
R 6 Start engine and stabilize at minimum idle for 5 minutes.
R 7 Determine 95 % of target N1 setting for OAT (Ref. Fig. 534)
R 8 On panel 133VU open circuit breaker ENGINES/ENG 1 & 2/IDLE/CTL/1
KR/335/R70.
R 9 Stabilize engine at approach idle.
R 10 Advance thrust lever in less than 1 second from stabilized approach
idle to take off power. As soon as engine N1 RPM has reached 95 % of
target N1, rapidly retard thrust lever to idle setting.
R 11 Record time taken from initial movement of actual N1 until actual N1
rpm has reached 95 % target N1 (Analog Gage).

NOTE : Normal time is 5 to 7 seconds.

R 12 Assure engine accelerates and decelerates smoothly.
R 13 Stabilize engine at approach idle.
R 14 Close circuit breaker ENGINES/ENG 1 & 2/IDLE/CTL/1 KR.
R 15 Stabilize at minimum idle for 5 minutes.
R 16 Shut down engine.

(b)Alternate procedure

1 Place engine trim pushbutton select switch "OFF".

CAUTION : SELECTION OF PMC SWITCH "OFF" SHOULD BE PERFORMED ONLY AT IDLE THRUST UNLESS OTHERWISE SPECIFIED. PMC SWITCH "OFF" AT HIGHER THRUST SETTING COULD CAUSE OVERBOOST/OVERTEMPERATURE OF THE ENGINE.

2 Start engine and stabilize at minimum idle for 5 minutes.

3 Determine 95 % of target N1 settings for OAT (Ref. Fig. 534)
4 SLOWLY advance thrust lever to target N1 setting determined for OAT.
5 After N1 reaches target setting stabilize for 10-15 seconds, assure limits are not being exceeded, and mark position of thrust lever leading edge on control stand.
CAUTION : THRUST LEVER POSITIONS MUST BE MARKED USING THE SAME EDGE. MIXED THRUST LEVER EDGE MARKING CAN RESULT IN IMPROPER SPEED SETTING OR OVERBOOST.
6 Retard thrust lever to idle position.
7 On panel 133VU open circuit breaker ENGINES/ENG 1 & 2/IDLE/CTL/1 KR/335/R70 stabilize at approach idle for 2 minutes.
8 Advance forward thrust lever in less than 1 second from idle to mark on control stand.
9 Record time taken from initial movement of thrust lever until actual N1 rpm has reached the 95 % N1 (Ref. Fig. 534).
NOTE : Normal time for this step is 5 to 7 seconds.
10 As soon as engine N1 RPM has reached 95 % of target N1, rapidly retard thrust lever to idle setting and check that engine decelerates smoothly with no tendency to stall or flame out.
NOTE : Cannot read min idle because CB pulled.
11 Stabilize engine at approach idle.
12 Close circuit breaker ENGINE/ENG 1 & 2/IDLE/CTL/1KR.
13 Stabilize engine at minimum idle for 5 minutes.
14 Shut down engine (Ref. 71-00-00, P. Block 501).

ACCEL CHECK

T2	N1 %	N1 %	T2	N1 %	N1 %	T2	N1 %	N1 %
°C	*TARGET	95 %	°C	*TARGET	95 %	°C	*TARGET	95 %
- 40	86.8	82.5	- 10	92.2	87.6	20	97.3	92.5
- 39	87.0	82.6	- 9	92.4	87.8	21	97.5	92.6
- 38	87.2	82.8	- 8	92.6	87.9	22	97.7	92.8
- 37	87.4	83.0	- 7	92.7	88.1	23	97.8	92.9
- 36	87.5	83.2	- 6	92.9	88.3	24	98.0	93.1
- 35	87.7	83.3	- 5	93.1	88.4	25	98.2	93.3
- 34	87.9	83.5	- 4	93.3	88.6	26	98.3	93.4
- 33	88.1	83.7	- 3	93.4	88.8	27	98.5	93.6
- 32	88.3	83.9	- 2	93.6	88.9	28	98.7	93.7
- 31	88.5	84.0	- 1	93.8	89.1	29	98.8	93.9
- 30	88.6	84.2	0	94.0	89.3	30	99.0	94.0
- 29	88.8	84.4	1	94.1	89.4	31	99.1	94.2
- 28	89.0	84.6	2	94.3	89.6	32	99.3	94.3
- 27	89.2	84.7	3	94.5	89.7	33	99.5	94.5
- 26	89.4	84.9	4	94.6	89.9	34	99.6	94.6
- 25	89.6	85.1	5	94.8	90.1	35	99.8	94.8
- 24	89.7	85.2	6	95.0	90.2	36	100.0	95.0
- 23	89.9	85.4	7	95.2	90.4	37	100.1	95.1
- 22	90.1	85.6	8	95.3	90.6	38	100.3	95.3
- 21	90.3	85.8	9	95.5	90.7	39	100.4	95.4
- 20	90.4	85.9	10	95.7	90.9	40	100.6	95.6
- 19	90.6	86.1	11	95.8	91.0	40	100.8	95.7
- 18	90.8	86.3	12	96.0	91.2	42	100.9	95.9
- 17	91.0	86.4	13	96.2	91.4	43	101.1	96.0
- 16	91.2	86.6	14	96.3	91.5	44	101.2	96.2
- 15	91.3	86.8	15	96.5	91.7	45	101.4	96.3
- 14	91.5	86.9	16	96.7	91.8	46	101.6	96.5
- 13	91.7	87.1	17	96.8	92.0	47	101.7	96.6
- 12	91.9	87.3	18	97.0	92.2	48	101.9	96.8
- 11	92.0	87.4	19	97.2	92.3	49	102.0	96.9
						50	102.2	97.1

*THRUST LEVER SET POSITION FOR ALTERNATE PROCEDURE PMC "OFF"

BM5 71 00 00 5 LNT0 01

95 % of Target N1 Setting VS OAT
Figure 534

12. HP Compressor (N2) Rotor Manual Cranking

A. General

Inspection of the high pressure rotor blades (HPC and HPT) requires a complete 360° rotation of the N2 (core) rotor for each stage inspected. This is accomplished either manually, or with a pneumatic turning device, through the accessory gearbox.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Circuit Breaker Safety Clips
(2)2C14649	Core Engine Motoring Fixture
(3)MSE44	Engine Rotation Borescope Fixture (Core Turning Tool)
(4)947OM35P01 or 947OM35P02	Caution Streamer, Borescope
(5)Material No.C02-021	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
(6)Material No.C10-071	Miscellaneous (Ref. 70-00-00)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

C. Job Set-Up

(1) Open, safety and tag the circuit breakers for the appropriate engine and open fan and thrust reverser cowl doors. (Ref. 71-13-00, P. Block 301)

(2) Remove nuts and washers and remove cover plate (Ref. Fig. 535, 536).

CAUTION : FIELD EXPERIENCE HAS SHOWN THAT CAUTION STREAMER IS REQUIRED TO REMIND MAINTENANCE PERSONNEL TO INSTALL MOTORING PAD COVER PLATE AFTER A BORESCOPE INSPECTION OF THE CORE.

(3) If using the drive socket ratchet (manual method), install the caution streamer on a core motoring pad stud. If using the pneumatic core turning device (pneumatic method), attach the caution streamer to the accessory gearbox or a hose/tube assembly near the core motoring pad.

D. Manual Method

(1) Attach a torque handle 0.5 in. (12.7 mm) square drive to idler gear.

(2) Rotate core as required turning torque handle in a slow even manner.

NOTE : If the N2 rotor is not easy to rotate and/or unusual noises, such as grating, are heard from the area of the main fuel pump during rotation, the main fuel pump may be unserviceable.

(3) Check the main fuel pump if :

(a) The N2 rotor is not easy to rotate.

(b) Unusual noises (such as grating) are heard in the area of the main fuel pump during rotation.

(4) Check the main fuel pump as follows :

(a) Remove the main fuel pump (Ref. 73-12-01, P. Block 401).

(b) Make sure that the main fuel pump rotates with less than 200 lbf.in. of input torque.

(c) If the input torque is more than 200 lbf.in., replace the main fuel pump (Ref. 73-12-01, P. Block 401).

(5)When inspection is complete, remove torque handle from idler gear.

E. Pneumatic Method

(1)Disconnect the clamps that secure the ignition lead to the area near the borescope core turning pad.

CAUTION : BENT STUDS CAN OCCUR IF TORQUE BAR HANDLE MAKES CONTACT WITH COVER PLATE STUDS. USE OF A SHORT EXTENSION TO THE DRIVE IS RECOMMENDED.

(2)Install air operated core engine rotating fixture 2C14649 over the pad studs. Install all nuts and TORQUE to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN) (Ref. Fig. 535, 536).

(3)Connect a shop air supply line to the remote control unit.

(4)Rotate core as required by selection of control position to produce clockwise (CW) or counterclockwise (CCW) rotation ; throttling of the supply of air varies the RPM of the air motor. To stop the rotation or direction of the air motor, select the mid position of the directional control.

NOTE : If the N2 rotor is slow to rotate and/or unusual noises, such as grating, are heard from the area of the main fuel pump during rotation, the main fuel pump may be unserviceable.

(5)Check the main fuel pump if:

(a)The N2 rotor is slow to rotate.

(b)Unusual noises (such as grating) are heard in the area of the main fuel pump during rotation.

(6)Check the main fuel pump as follows :

(a)Remove the main fuel pump (Ref. 73-12-01, P. Block 401).

(b)Make sure that the main fuel pump rotates with less than 200 lbf.in. of input torque.

(c)If the input torque is more than 200 lbf.in., replace the main fuel pump (Ref. 73-12-01, P. Block 401).

(7)When inspection is complete, remove air operated core engine rotating fixture 2C14649.

F. Close-Up

CAUTION : MAKE SURE YOU INSTALL THE COVER PLATE. THE COVER PLATE LOCATION IS DIFFICULT TO SEE DURING ENGINE MAINTENANCE. IF THE COVER PLATE IS NOT INSTALLED OR THERE IS AN INCORRECT INSTALLATION, THE INSTALLATION WILL CAUSE A LARGE OIL LEAK AND ENGINE DAMAGE CAN OCCUR WHEN THE ENGINE IS OPERATED.

(1)If the manual method was used, remove the caution streamer from the core motoring pad stud. If the pneumatic method was used, remove the caution streamer from the accessory gearbox or hose/tube assembly.

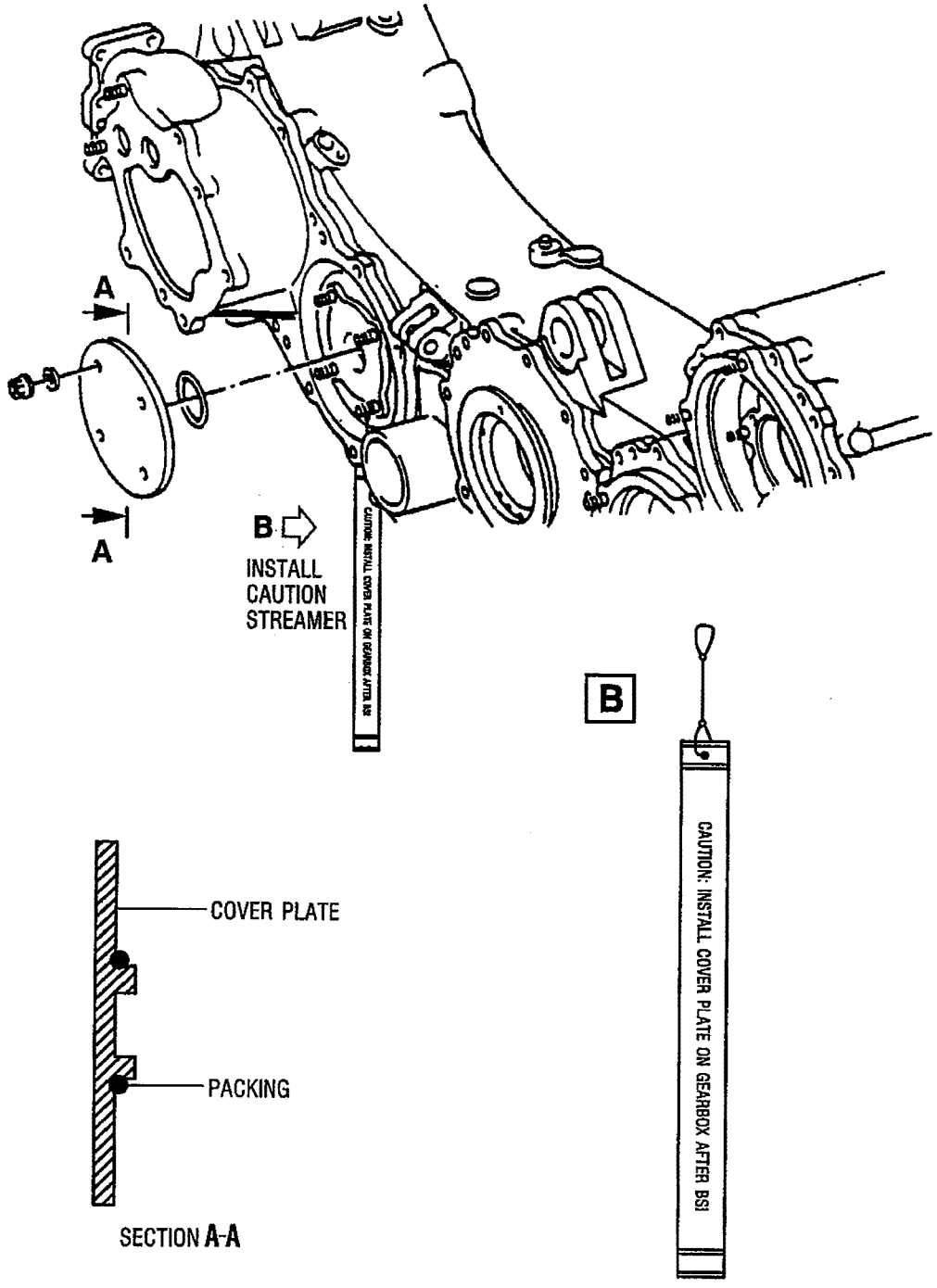
(2)Install the cover on the accessory gearbox.

(a)Lubricate the preformed packing with clean engine oil with Material No.C02-021.

(b)Install the preformed packing on the cover plate and align the holes in the cover with the studs in the pad adapter.

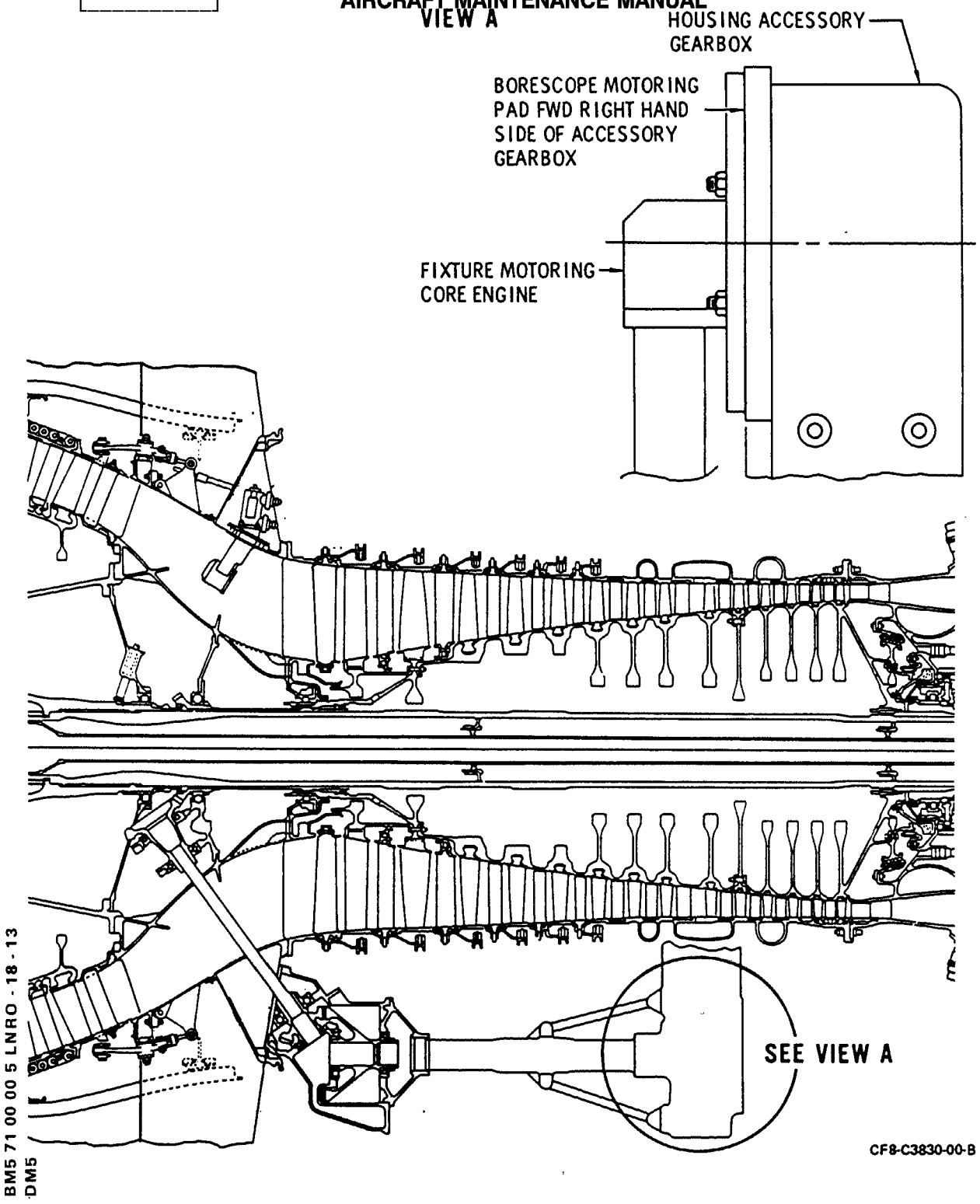
(c)Install the washers and the nuts. TORQUE the nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(d)Connect the clamps that secure the ignition lead to the area near the borescope core turning pad.



BM5 71 00 00 5 LNP0 01

Motoring Pad Cover Installation
Figure 535


VIEW A
HOUSING ACCESSORY GEARBOX
BORESCOPE MOTORING PAD FWD RIGHT HAND SIDE OF ACCESSORY GEARBOX
FIXTURE MOTORING CORE ENGINE
SEE VIEW A
CF8-C3830-00-B
BM5 71 00 00 5 LNRO - 18 - 13
DM5

Installation of Core Engine Rotor Turning Devices
Figure 536

1 TORQUE the clamp bolts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

(3)Close the thrust reverser and fan cowl doors. Remove the safety clips and tags and close the circuit breakers (Ref. 71-13-00, P. Block 301).

(4)Perform an idle leak check.

13. Replacement Engine Test (Untested)

This test provides the necessary information for checking a newly installed engine that has not been tested in an approved test cell per the shop procedures prior to installation.
This test is effectively a combination of all the tests presented in this section.

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedures	
- 12-11-28, P. Block 301	Replenishing of Fuel Tanks
- 12-12-29, P. Block 1	Hydraulics
- 12-13-24, P. Block 1	Electrical Power
- 12-13-79, P. Block 1	Oil System Replenishment
- 20-28-11, P. Block 1	Electrical Bonding
- 21-51-00, P. Block 301	Air Cooling System
- 24-11-00, P. Block 301	IDG System
- 26-12-00, P. Block 501	Engine Fire and Overheat Detection
- 29-10-00, P. Block 301	Pressurize Hydraulic System
- 30-21-00, P. Block 501	Engine Air Intake Ice Protection
- 71-13-00, P. Block 301	Cowl Doors
- 71-70-00, P. Block 601	Engine Drains
- 72-00-00, P. Block 201	Engine - General
- 72-00-00, P. Block 501	Engine - General
- 72-00-00, P. Block 601	Engine - General
- 73-12-01, P. Block 601	Fuel Pump
- 73-12-03, P. Block 601	Fuel Filter
- 76-11-00, P. Block 501	Throttle Controls
- 79-00-00, P. Block 601	Oil - General
- 79-21-01, P. Block 401	Lube and Scavenge Pump
- 79-22-01, P. Block 401	Scavenge Oil Filter
- 80-13-01, P. Block 601	Pneumatic Starter

B. Job Set-Up

CAUTION : TO AVOID CHOOSING WRONG CHECKOUT TARGET, DO NOT USE AIRPLANE TOTAL AIR TEMPERATURE INDICATION FOR AMBIENT AIR TEMPERATURE. MAKE SURE TO GET LOCAL BAROMETRIC PRESSURE (NOT CORRECTED TO SEA LEVEL) FROM CONTROL TOWER.

CAUTION : DO NOT TAKE MERCURY THERMOMETER ON BOARD AIRPLANE. IF THERMOMETER BREAKS, MERCURY CONTACTING AIRPLANE COMPONENTS COULD RESULT IN DAMAGE TO COMPONENTS.

(1) Determine ambient air temperature [outside air temperature (OAT)] using thermometer. Take reading in shaded area of airplane.

C. Procedure

(1) If engine has been preserved, perform engine depreservation (Ref. 72-00-00, P. Block 201).
(2) On panel 9VU

(a)Remove rigging pin PN 98A76101003 from autothrottle coupling unit.
(b)Operate thrust and throttle control levers several times and check for binding.
In case of friction points, adjust (Ref. 76-11-00, P. Block 501).
(3)Do a check of the primary electrical bonding between the engine structure and the aircraft structure.
(a)Make certain that the resistance (obmic) is correct as per Table of Maximum Permissible Resistance Values (Ref. 20-28-11, P. Block 1).
(4)Check levels of :
(a)Oil (Ref. 12-13-79, P. Block 1).
(b)Fuel (Ref. 12-11-28, P. Block 301).
(c)Hydraulic fluid (Ref. 12-12-29, P. Block 1).
(d)IDG (Ref. 12-13-24, P. Block 1).
(5)Pressurize Green and Blue (Green and Yellow) hydraulic systems (Ref. 29-10-00, P. Block 301).
(6)Check the ECAM system as follow :
(a)Check that the breakers located in the following lines and panels are closed :

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H10
21VU	AIDS		105/E 2 thru E5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 - STICK SHAKR		109/A 2 thru A5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16

ACTION	RESULT
1. On center pedestal - place HP fuel shut off valve control lever in ON position	On center instrument panel - OIL LO PRESS light comes on. On center pedestal, on HP fuel shut off valve control lever - HP VALVE light comes on after 3 sec. On the ECAM DU - ENG1(2) FAIL message comes on after 70 sec.

NOTE : If the ECAM DU page is full, this message will only be displayed if you clear the previous messages.

On CAPT and F/O main instrument panels :

ACTION	RESULT
	- MASTER CAUTION light comes on. - Single chime.
NOTE : Disregard all other warnings	
2. On center pedestal - place HP fuel shut off valve control lever in OFF position	On center pedestal on HP fuel shut off valve control lever : - HP VALVE light goes off
NOTE : Disregard all other warnings	
	On center instrument panel - OIL LO PRESS light goes off.
3. On ECAM control panel - press CLR pushbutton switch	On CAPT and F/O main instrument panels - MASTER CAUTION Light goes off. On the ECAM DU - ENG1(2) FAIL message goes off.

R (7)Pressurize Green and Blue (Green and Yellow) hydraulic systems (Ref. 29-10-00, P. Block 301).

R (8)Check fire protection system (Ref. 26-12-00, P. Block 501, operation test).

R (9)Perform TRA Ground Test as follow :

(a)Operate thrust and throttle control levers from idle thrust to max thrust.

(b)On RH ECAM control panel check that the TRA is in accordance with the value indicated on the graduated gate of the throttle control lever (Ref. Fig. 537).

(c)Make certain that throttle control lever are in idle position.

R (10)Examine the anti-ice system (Ref. 30-21-00, P. Block 501).

R (11)Test the hydraulic pumps as follow :

ACTION	RESULT
(a)On ECAM control panel : - Make certain that SGU 1 and SGU 2 pushbutton switches are pressed in. - Press HYD pushbutton switch	On R ECAM display unit. - HYD page appears.
(b)On panel 427VU :	

ACTION	RESULT
- Release (out) the four HYD PWR/ PUMPS pushbutton switches.	
(c)Engine 1	
On panel 427VU	
- press (in) HYD PWR/B/PUMPS ENG 1 pushbutton switch	Check Blue pressure 3000 ± 200 psi (206 ± 13.5 bars)
- release (out) HYD PWR/B/PUMPS ENG 1 pushbutton switch	Check Blue pressure decreasing
- press (in) HYD PWR/G/PUMPS ENG 1 pushbutton switch	Check Green pressure 3000 ± 200 psi (206 ± 13.5 bars)
- release (out) HYD PWR/G/PUMPS ENG1 pushbutton switch.	Check Green pressure decreasing
(d)Engine 2	
On panel 427VU	
- press (in) HYD PWR/G/PUMPS ENG 2 pushbutton switch	Check Green pressure 3000 ± 200 psi (206 ± 13.5)
- release (out) HYD PWR/G/PUMPS ENG 2 pushbutton switch	Check Green pressure decreasing
- press (in) HYD PWR/Y/PUMPS ENG 2 pushbutton switch	Check Yellow pressure 3000 ± 200 psi (206 ± 13.5 bars)
ENG 2 pushbutton switch.	

R (12)Disconnect aircraft from ground power units and perform preparation prior to engine starting (close all circuit breakers).
R (13)Perform engine Dry Motoring (Ref. Para. 8. - Motoring).
R (14)Perform engine Wet Motoring (Ref. Para. 8. - Motoring).
R (15)Perform engine Ground Idle Check (Ref. Para. 9. - Engine Run).
R (16)Perform engine Approach Idle Check (Ref. Para. 11. - Adjustment/Test).
R (17)Perform Engine Shutdown (Ref. Para. 9. - Engine Run).
R (18)Open thrust reverser halves (Ref. 71-13-00, P. Block 301).
R (19)Record oil level and engine run time to calculate engine oil consumption rate.
R (20)Check torque of each pneumatic duct clamp.
Retighten clamps as required.
NOTE : This is a one time check unless the ducting is disassembled following this test. Such disassembly requires torque check after next engine run.
R (21)Close thrust reverser halves (Ref. 71-13-00, P. Block 301).

CAUTION : KEEP PNEUMATIC POWER SUPPLIED DURING HIGH POWER RUNS IN THE EVENT THAT ENGINE MOTORING IS NECESSARY.
CAUTION : KEEP GREEN HYDRAULIC SYSTEM PRESSURIZED TO ENSURE POSITIVE CONTROL OF NOSE GEAR STEERING AND MAIN GEAR BRAKES.

R (22)Prepare and start engine by performing Engine Run (Ref. Para. 9. - Engine Run).
R (23)Maintain hydraulic, pneumatic and electrical power.

R (24)Allow engine to stabilize at minimum idle for 10 minutes (Ref. Para. 11. - Adjustment/Test).
R (25)Record TRA, N1 and N2 on data sheet.
R (26)Determine approach idle (Ref. Para. 11 - Adjustment/Test).
R (27)Allow engine to stabilize at approach idle for 3 minutes (Ref. Para. 11. - Adjustment/Test).
R (28)Record TRA N1 and N2.

WARNING : BEFORE STARTING ONE OR BOTH ENGINES, ALL SAFETY AND OPERATING PRECAUTION MUST BE OBSERVED DURING ENGINE OPERATION (REF. PARA. 3.H.)

CAUTION : AVOID COMPRESSOR STALL. NEVER ADVANCE OR FAIL TO RETARD THRUST LEVER ON AN ENGINE THAT IS STALLING. ENGINE DAMAGE COULD RESULT.

CAUTION : DO NOT USE IGNITION AFTER START. USE OF IGNITION AFTER START COULD CAUSE OVERTEMPERATURE IN THE EVENT OF A COMPRESSOR STALL.

R (29)If new seals are installed in engine, perform :
Seal Run-in (Ref. Para. 11. - Adjustment/Test).

CAUTION : DO NOT EXCEED VIBRATION GUIDELINE VALVES. DAMAGE TO ENGINE MAY OCCUR.

R (30)Perform Vibration Check (Ref. 72-00-00, P. Block 501).
R (31)Perform Variable Stator Vane (VSV) Tracking Check (Ref. Para. 11. - Adjustment/Test).
R (32)Perform 83% Power Assurance Check (Ref. Para. 11. - Adjustment/Test).
R (33)Perform Power Management Control (PMC) Check (Ref. Para. 11. - Adjustment/Test).
R (34)Optional Procedure : Perform Acceleration Check (Ref. Para. 11. - Adjustment/Test).
R (35)Shut down engine (Ref. Para. 9. - Engine/Run).
R (36)Clean air conditioning ducts (Ref. 21-51-00, P. Block 301).

NOTE : Cleaning of the air conditioning ducts is necessary when :
- the engine is removed following oil over consumption
- oil contamination of ducts is evidenced.

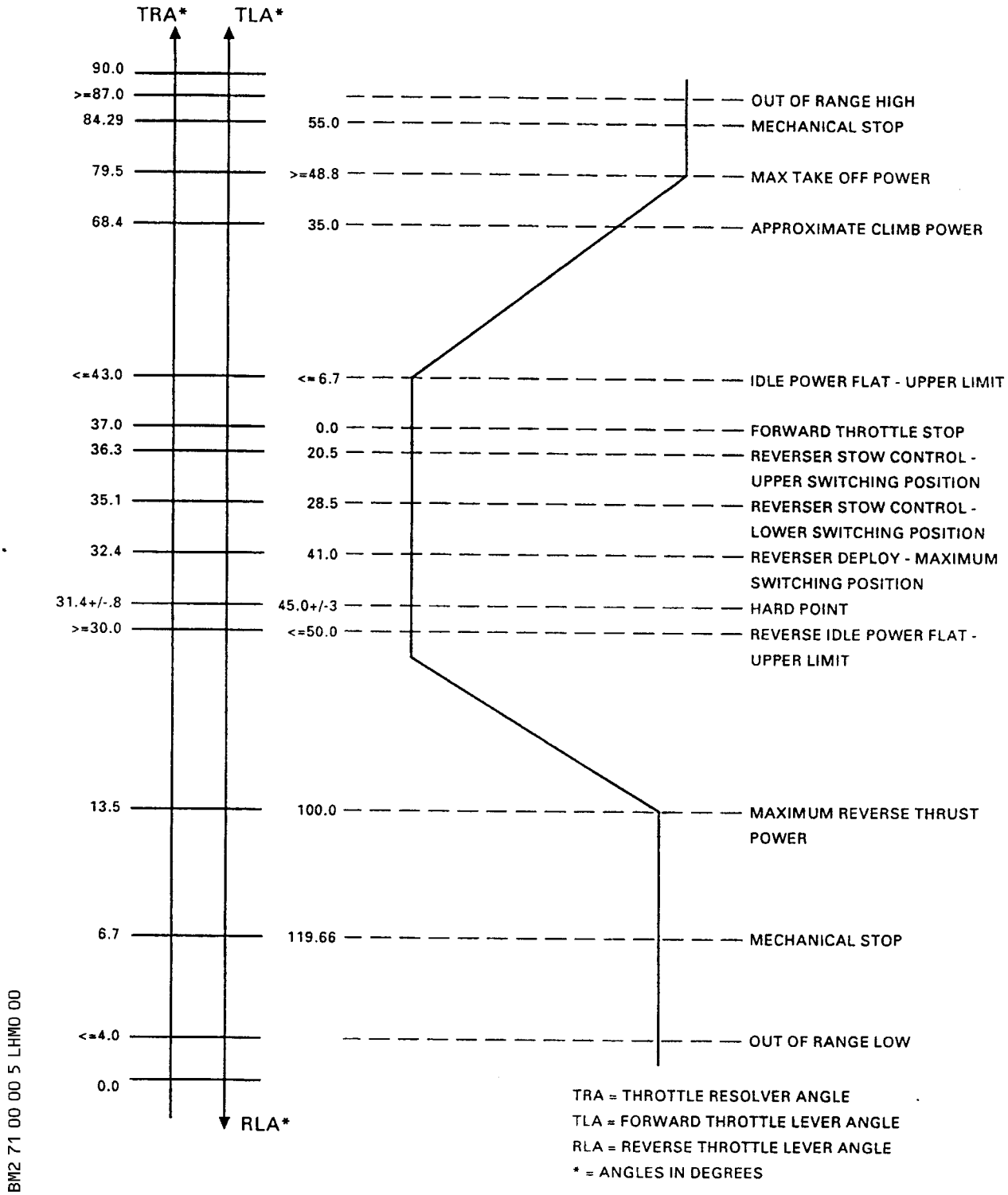
D. Close-Up

(1)Open thrust reverser halves (Ref. 71-13-00, P. Block 301).
(2)Check torque of each pneumatic duct clamp. Retighten clamps as required.

NOTE : This is a one time check unless the ducting is disassembled following this test. Such disassembly requires torque check after next engine run.

(3)Check all engine drains for leakage and record leakage (Ref. 71-70-00, P. Block 601).
(4)Check oil level and record oil level. Add oil, if necessary, to bring oil level to full (Ref. 12-13-79, P. Block 1).
(5)Calculate the engine oil consumption rate as follows :
Engine Oil Added : ---------- Quarts
Total Time of Engine Run : ---------- Hours ---------- Minutes
Oil Consumption Rate : ---------- Quarts/Hour
(6)Check engine oil supply and scavenge inlet screens, and magnetic chip detectors for debris (Ref. 79-00-00, P. Block 601).
(7)Check master magnetic chip detector for metal particles.

(8)Remove scavenge oil filter element (Ref. 79-22-01, P. Block 401) and lube filter element (Ref. 79-21-01, P. Block 401) and check for contamination. If filter elements are not contaminated, reinstall removed elements.
(9)Check fuel filter element for contamination (Ref. 73-12-03, P. Block 601).
(10)Remove fuel pump strainer (Ref. 73-12-01, P. Block 601) and check for debris.
(11)Remove IDG scavenge oil filter element (Ref. 24-11-00, P. Block 301) and check for contamination. If filter element is not contaminated, reinstall removed element.
(12)Check starter magnetic probe for metal particles (Ref. 80-13-01, P. Block 601).
(13)Perform Borescope Inspection of HPC and HPT (Ref. 72-00-00, P. Block 601).
(14)Declare engine Serviceable if engine passes Replacement Engine Test (Untested) (Ref. Para. 13. - Replacement Engine Test (Untested).
(15)Close thrust reverser halves (Ref. 71-13-00, P. Block 301).
(16)Check level of hydraulic fluid (Ref. 12-12-29, P. Block 001)



BM2 71 00 00 5 LHM0 00

Throttle Lever Angle Position
Figure 537

14. General Procedures if an Engine Fire Occurs During Ground Operation

A. General

This paragraph includes the precautions which must be obeyed before the engine is started and the general steps during operation.

B. Procedure

(1) Obey these instructions which follow.

(a) Do these steps before the engine is started.

1 Make sure that you have fire extinguishers near the aircraft.

2 Make sure that you have persons near the fire extinguishers who can operate them correctly.

NOTE : The position of the fire team can be changed by the local regulations and/or conditions.

3 Make sure the fire team is clear of the inlet and exhaust dangerous areas.

4 Make sure that the fire team can speak to the flight compartment persons with the service interphone system.

5 Make sure that the fire team will tell the persons in the flight compartment if an engine has a fire.

6 Use only carbon dioxide fire extinguisher.

CAUTION : **USE A CARBON DIOXIDE FIRE EXTINGUISHER. ONLY USE AN ALTERNATIVE TYPE OF FIRE EXTINGUISHER IF THE CARBON DIOXIDE TYPE IS NOT AVAILABLE. THE CARBON DIOXIDE FIRE EXTINGUISHER WILL NOT CAUSE CORROSION. THE ALTERNATIVE TYPE OF FIRE EXTINGUISHERS CAN CAUSE DAMAGE TO METAL, PLASTICS AND RUBBER.**

- Use only carbon dioxide fire extinguishers on an engine fire.

(b) Do these general steps if there is an engine fire during ground operation.

1 Stop the engine.

2 To help control the engine fire, stop the other engine if it has been started

3 Do the applicable procedure to extinguish the fire.

- For an external fire with the engine cowls closed (see paragraph 15.)
- For an external fire with the engine cowls open or removed (see paragraph 16.)
- For an internal fire in an engine that is stopped (see paragraph 17.)
- For an internal fire during engine start/stop or high exhaust gas temperature (EGT) (see paragraph 18.)

4 If it is necessary to use the ground fire extinguishers the fire team must speak with the flight compartment persons.

5 After a fire extinguisher has been used, the engine must be cleaned and examined.

NOTE : Please report all ENGINE FIRES to GE Aviation through GE Rep for Customer Support Center (CSC).

15. Procedure if an External Engine Fire Occurs During Ground Operation with the Engine Cowls Closed

A. Procedure

(1) Extinguish the engine fire

(a) Do these steps if you have a fire bell warning when the engine has started:

1 The **ENG 1(2) FIRE** legend on the **ENG 1(2) FIRE** pushbutton switch comes on.

2 The continuous repetitive chime operates.

3 The **MASTER WARN** lights come on.

4 On the left **ECAM** display unit, a message and the applicable procedure come into view.

5 Move the **THROTTLE** levers to the idle position.

6 Set the **ENG MASTER 1(2)** Fuel Lever to the **OFF** position.

7 Push the **ENG 1(2) FIRE** pushbutton switch.

8 The **SQUIB** legends of the applicable **AGENT 1** and **AGENT 2** pushbutton switches come on.
- The aural warning stops.

9 Push the **AGENT 1** pushbutton switch.
- After 10 seconds delay, the **DISCH** legends of these pushbutton switch come on.

10 If fire is still annunciated after 30 seconds,
push the **AGENT 2** pushbutton switch.
After 30 seconds delay, the **DISCH** legends of these pushbutton switch come on.

11 Set the **ENG MASTER 2(1)** switch to the **OFF** position.

CAUTION : USE A CARBON DIOXIDE FIRE EXTINGUISHER. ONLY USE AN ALTERNATIVE TYPE OF FIRE EXTINGUISHER IF THE CARBON DIOXIDE TYPE IS NOT AVAILABLE. THE CARBON DIOXIDE FIRE EXTINGUISHER WILL NOT CAUSE CORROSION. THE ALTERNATIVE TYPE OF FIRE EXTINGUISHERS CAN CAUSE DAMAGE TO METAL, PLASTICS AND RUBBER.

12 Open the cowl doors and extinguish the fire with a fire extinguisher if the fire is not completely extinguished by this procedure.

(b) Do these steps when the fire is out.

CAUTION : DO NOT START THE ENGINE AGAIN UNTIL YOU DO THE STEPS BELOW. IF YOU DO NOT DO THESE STEPS YOU CAN CAUSE DAMAGE TO THE ENGINE.

1 Examine the engine and the nacelle for fire damage.

2 Inspect all affected areas for any evidence of fire/heat damage and repair or replace the engine as necessary.

3 Find and correct the cause of the fire warning.

4 Replace the nacelle fire extinguisher bottles if they are used.

5 Do the removal/installation procedure of the engine fire extinguisher bottle (Ref. 26-21-15, P. Block 401).

(2) If the crew closed the fire shutoff valve during operation of the fire extinguishers, do the check of the hydraulic system after operation of the engine pumps in possible starvation or cavitations condition

(Ref. 29-00-00, P. Block 301).

NOTE : Please report all ENGINE FIRES to GE Aviation through GE Rep for Customer Support Center (CSC).

16. Procedure if an Engine Fire Occurs During Ground Operation with the Engine Cowls Open or Removed

A. Procedure

(1) Extinguish the engine Fire

(a) Do these steps if you have a fire bell warning when the engine has started:

1 The **ENG 1(2) FIRE** legend on the **ENG 1(2) FIRE** pushbutton switch comes on.
2 The continuous repetitive chime operates.
3 The **MASTER WARN** lights come on.
4 On the left **ECAM** display unit, a message and the applicable procedure come into view.
5 Move the **THROTTLE** levers to the idle position.
6 Set the **ENG MASTER 1(2)** Fuel Lever to the **OFF** position.
7 Push the **ENG 1(2) FIRE** pushbutton switch.
8 The **SQUIB** legends of the applicable **AGENT 1** and **AGENT 2** pushbutton switches come on.
-The aural warning stops.
9 Push the **AGENT 1 + 2** pushbutton switches.
-After not many seconds, the **DISCH** legends of these pushbutton switches come on.
10 An interval of 30 seconds is necessary before you do the next step. This is to let the fire detection system reset.
11 Set the **ENG MASTER 2(1)** switch to the **OFF** position.
12 Open the cowl doors and extinguish the fire with a fire extinguisher if the fire is not completely extinguished by this procedure.

(b) Do these steps when the fire is out.

CAUTION : **DO NOT START THE ENGINE AGAIN UNTIL YOU DO THE STEPS BELOW. IF YOU DO NOT DO THESE STEPS YOU CAN CAUSE DAMAGE TO THE ENGINE.**

1 Examine the engine and the nacelle for fire damage.
2 Repair or replace the engine if it is necessary.
3 Find and correct the cause of the fire warning.
4 Replace the nacelle fire extinguisher bottles if they are used.
5 Do the removal/installation procedure of the engine fire extinguisher bottle (Ref. 26-21-15, P. Block 401).

(2) If the crew closed the fire shutoff valve during operation of the fire extinguishers, do the check of the hydraulic system after operation of the engine pumps in possible starvation or cavitations condition (Ref. 29-00-00, P. Block 301).

NOTE : Please report all **ENGINE FIRES** to GE Aviation through GE Rep for Customer Support Center (CSC).

17. Procedure if an Internal Fire Occurs in an Engine that is Stopped

A. General
This procedure is given to extinguish a fire that occurs without an external cause while a person is in the flight compartment.

B. Procedure
(1) Extinguish the fire.
(a) Do these steps to extinguish the fire
1 Dry motor the engine to try to extinguish the fire. (Ref. 71-00-00, P. Block 501).
2 If the dry motor procedure does not extinguish the fire, use the fire extinguishers that are on the ground.
CAUTION : USE A CARBON DIOXIDE FIRE EXTINGUISHER. ONLY USE AN ALTERNATIVE TYPE OF FIRE EXTINGUISHER IF THE CARBON DIOXIDE TYPE IS NOT AVAILABLE. THE CARBON DIOXIDE FIRE EXTINGUISHER WILL NOT CAUSE CORROSION. THE ALTERNATIVE TYPE OF FIRE EXTINGUISHERS CAN CAUSE DAMAGE TO METAL, PLASTICS AND RUBBER.
(b) Inspect all affected areas for any evidence of fire/heat damage and repair or replace the engine as necessary.
NOTE : Please report all ENGINE FIRES to GE Aviation through GE Rep for Customer Support Center (CSC).

18. Procedure if there is an Internal Engine Fire, a Tail Pipe Fire or High EGT During Ground Operation

A. General
This paragraph gives the procedure when an engine fire warning has NOT been shown. It includes the procedures when the stater is engaged or has disengaged.

B. Procedure
(1) Follow the steps to correct the incident.
(a) Do these steps if you have a high EGT or an internal engine fire during the start procedure (Before the starter disengages).
1 Set the ENGINE MASTER fuel shut off lever to the OFF position.
2 Continue to dry motor the engine to decrease the EGT or to extinguish the internal fire.
3 Dry motor the engine again until all signs of fire (flame or smoke) are gone. (Ref. 71-00-00, P. Block 501).
NOTE : Make sure that the ground crew agrees that the fire is extinguished.
(b) Do these steps if you have a high EGT or an internal engine fire during the engine start procedure (After the starter disengages). You must also do these steps if an internal fire occurs at some other time during ground operation.
1 Set the ENGINE MASTER lever to the OFF position.
2 Set the ENGINE START rotary selector to CRANK when N2 is less then 30 percent.
3 Dry motor the engine (Ref. 71-00-00, P. Block 501).
4 Continue to dry motor the engine until all signs of the fire (flame or smoke) are gone.
NOTE : Make sure that the ground crew agrees that the fire is extinguished.
NOTE : If the starter was used for more than the specified time limits, replace the starter.
(c) Conduct an investigation to determine the root cause of the fire, and inspect all affected areas for any evidence of fire/heat damage and repair and replace the engine as necessary.
NOTE : Please report all ENGINE FIRES to GE Aviation through GE Rep for Customer Support Center (CSC).

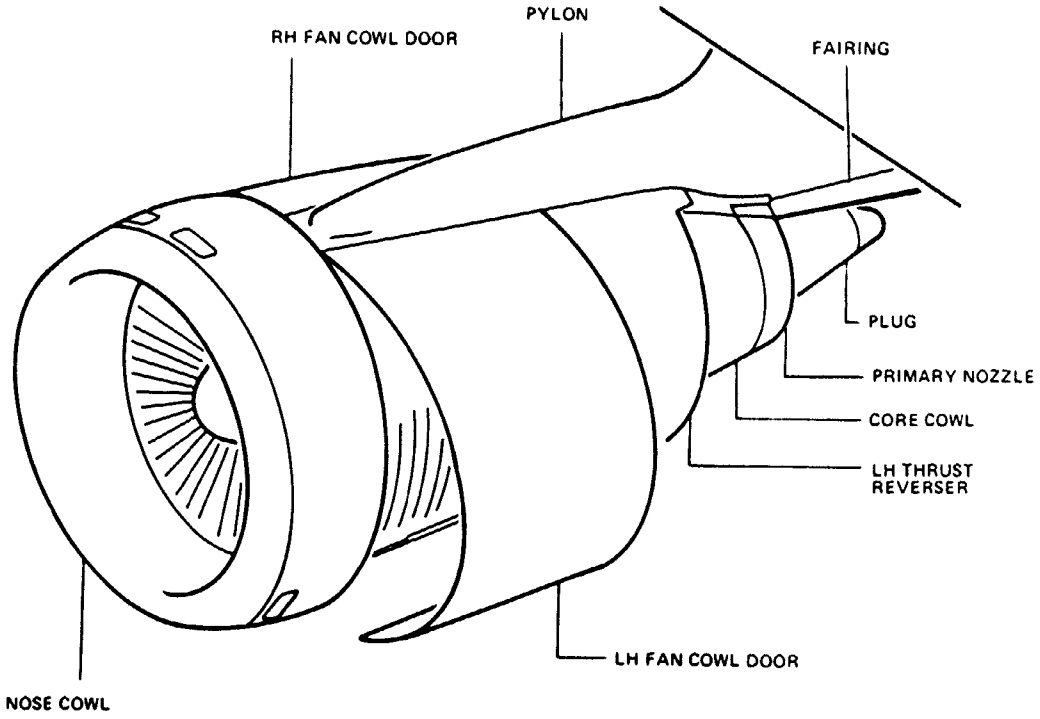
COWLING - DESCRIPTION AND OPERATION

1. General (Ref. Fig. 001, 002)

Cowls and cowl doors enclose the periphery of the engine so as to form the engine nacelle. The nacelle provides protection for the engine and the accessories and also ensures airflow around the engine during flight. This section presents the description of the following cowls.

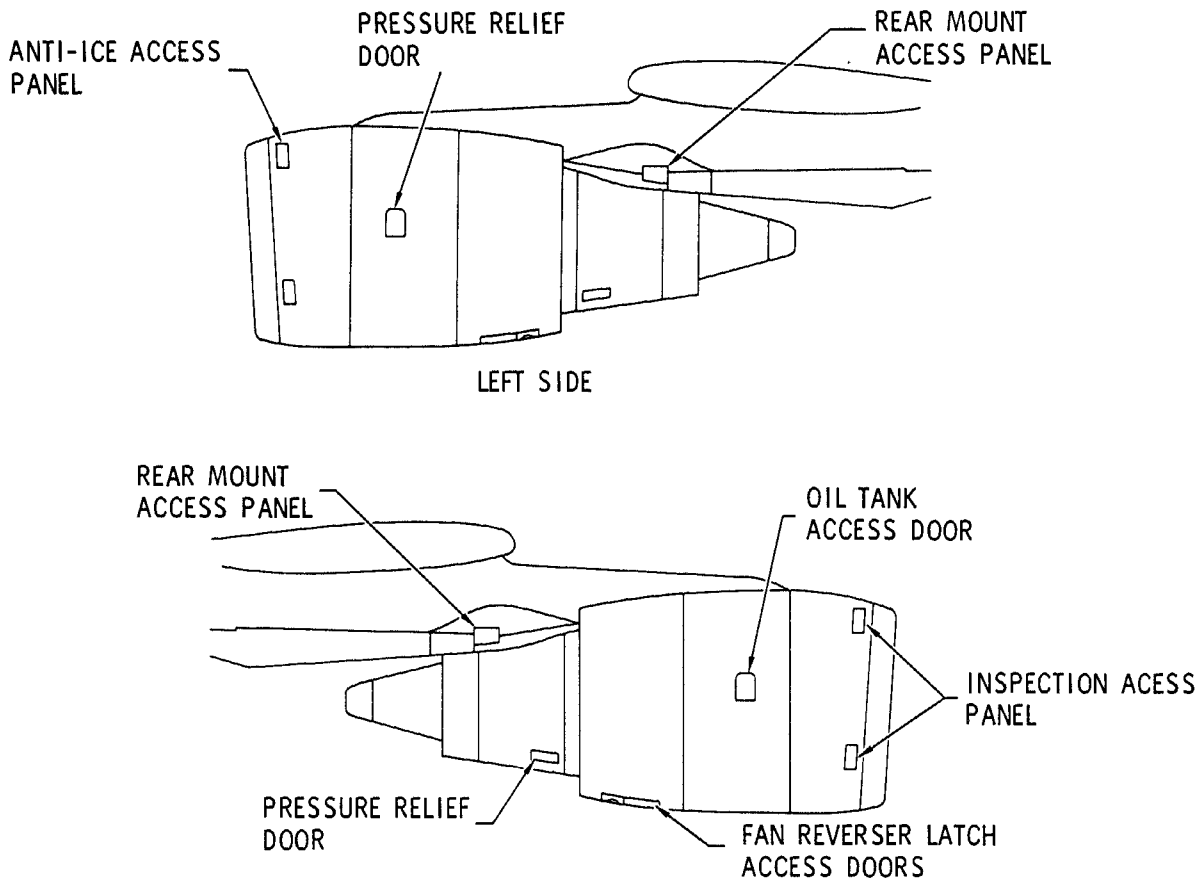
- nose cowl
- fan cowl
- fan reverser cowl
- core cowl

NOTE : The fan cowl, the fan reverser cowl and the core cowl remain on the pylon when the engine is removed. The nose cowl and the core fixed nozzle are removed with the engine.



BM5 71 10 00 0 LAMO 13 07
DM6

Nacelle Components
Figure 001


ANTI-ICE ACCESS PANEL
PRESSURE RELIEF DOOR
REAR MOUNT ACCESS PANEL
LEFT SIDE
REAR MOUNT ACCESS PANEL
OIL TANK ACCESS DOOR
INSPECTION ACESS PANEL
PRESSURE RELIEF DOOR
FAN REVERSER LATCH ACCESS DOORS
RIGHT SIDE
LEFT HAND REVERSER HALF IDG SERVICING ACCESS DOOR
RIGHT HAND REVERSER HALF F/R LATCH ACCESS DOOR

CF8-6728-00-A

BM5 71 10 00 0 LCMO - 13 - 07
DM5

Nacelle Access Doors and Openings
Figure 002

NOSE COWL - DESCRIPTION AND OPERATION

1. General

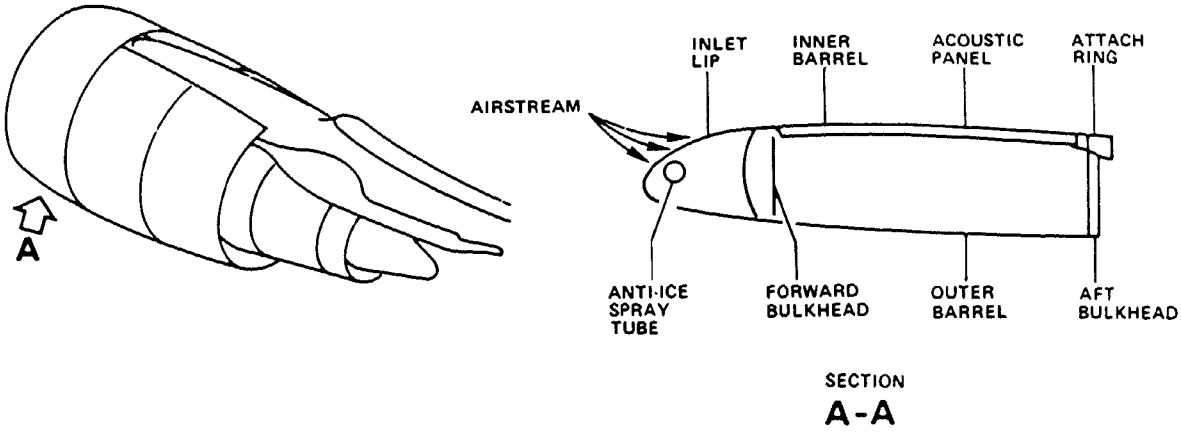
The nose cowl is a fixed interchangeable aerodynamic fairing which supplies the inlet airflow to the fan and core sections of the engine. It is mounted on the forward face of the engine fan case. The assembly is composed of an acoustic inner barrel, an outer barrel, a nose lip and forward and aft bulkheads. The nose cowl assembly includes installation of anti-icing ducting, and ground interphone jack.

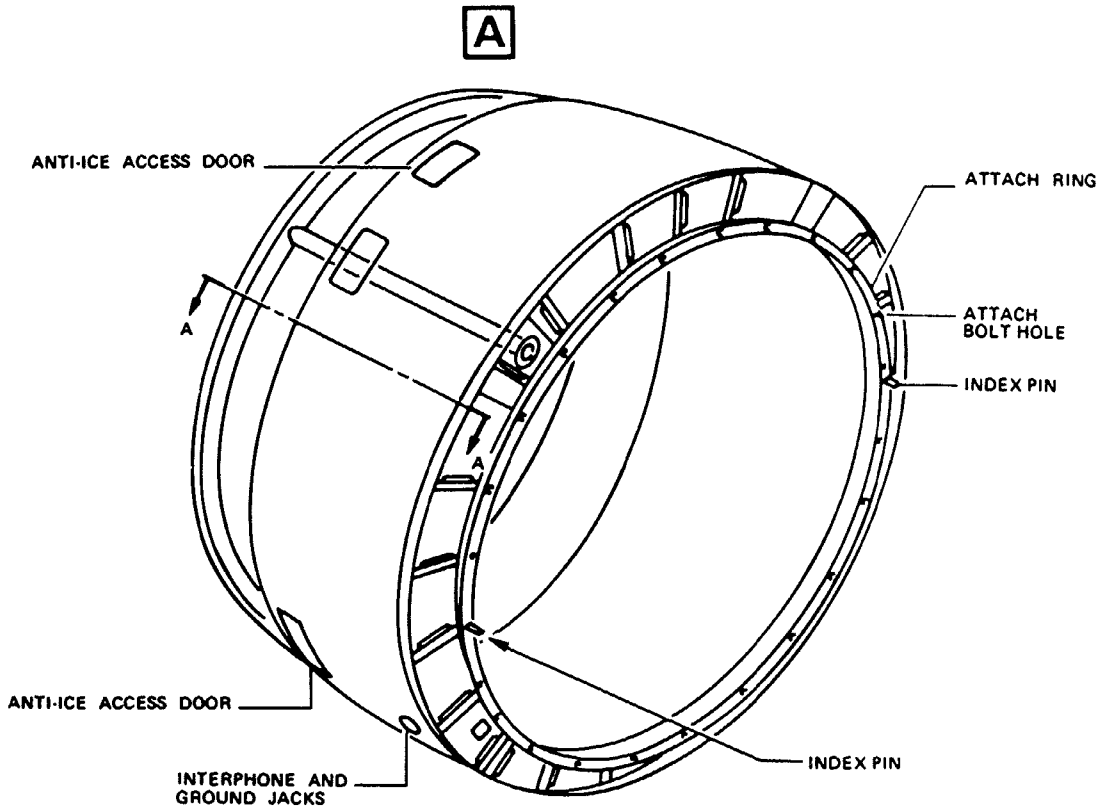
2. Description (Ref. Fig. 001, 002)

The outer barrel of the nose cowl is a composite/sandwich-frame construction (filament wound). The inner barrel consists of acoustically treated, bonded aluminium and core non-metallic honeycomb structure panels, which are installed with mechanical fasteners and is bolted to the engine fan case forward flange. The acoustic area is approximately 60 square feet.
The inlet lip assembly consists of an outer skin and bulkhead. It is made of aluminium alloy.
The nose cowl aft bulkead consists of formed titanium sheet metal.
The majority of the internal pressure loads and external air loads are taken in hoop tension through the skins and frames. Longitudinal and transverse loads due to the inlet cowl structure's own inertial as well as any internal or external body not taken in hoop tension are distributed into the fan case forward flange through a bolted joint. Twenty four attachment bolts and two guide pins are provided.
Four hoist points for ground support equipment are provided on the top portion of the nose cowl.
The nose cowl can be removed with engine installed on the aircraft.

3. Nose Cowl Anti Icing (Ref. Fig. 002)

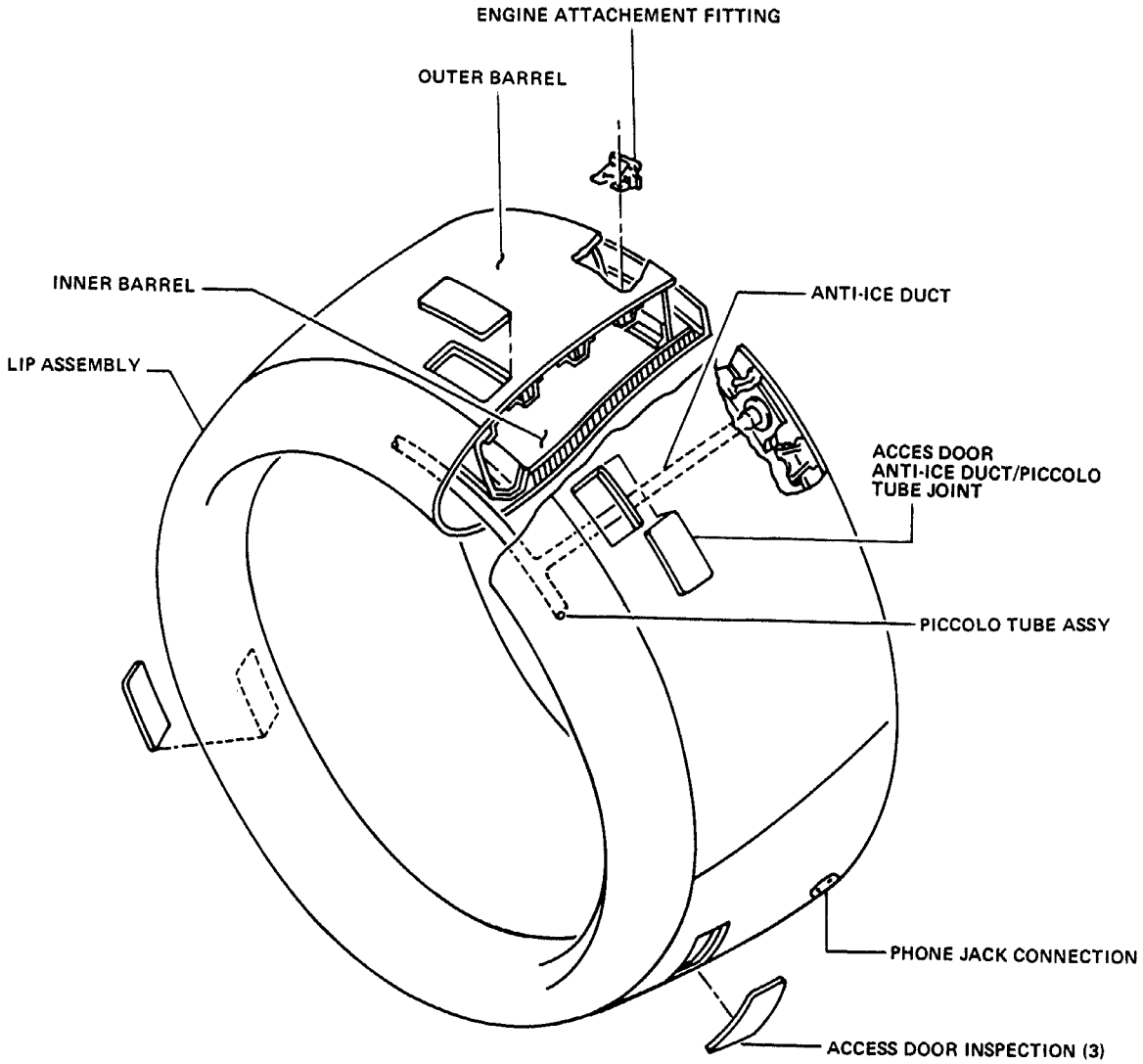
The inlet lip comprises the anti-icing "D" duct. The anti-ice duct connects to a piccolo tube in the "D" duct.
Engine bleed air is fed into the inlet lip
cavity through the piccolo tube duct.
A slip point is provided immediately aft of and mounted on the "D" duct forward bulkhead to allow
for duct thermal expansion. Four panels allow
access to inspect anti-icing system ducting.





BM5 71 11 00 0 LAMO 13 07
DM5

Nose Cowl
Figure 001



BM5 71 11 00 0 LCM0 13 07
DM5

CF6 80C2 Nose Cowl Components
Figure 002

NOSE COWL - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the nose cowl.

B. Access to the nose cowl is through the fan cowl doors.

2. Equipment and Material

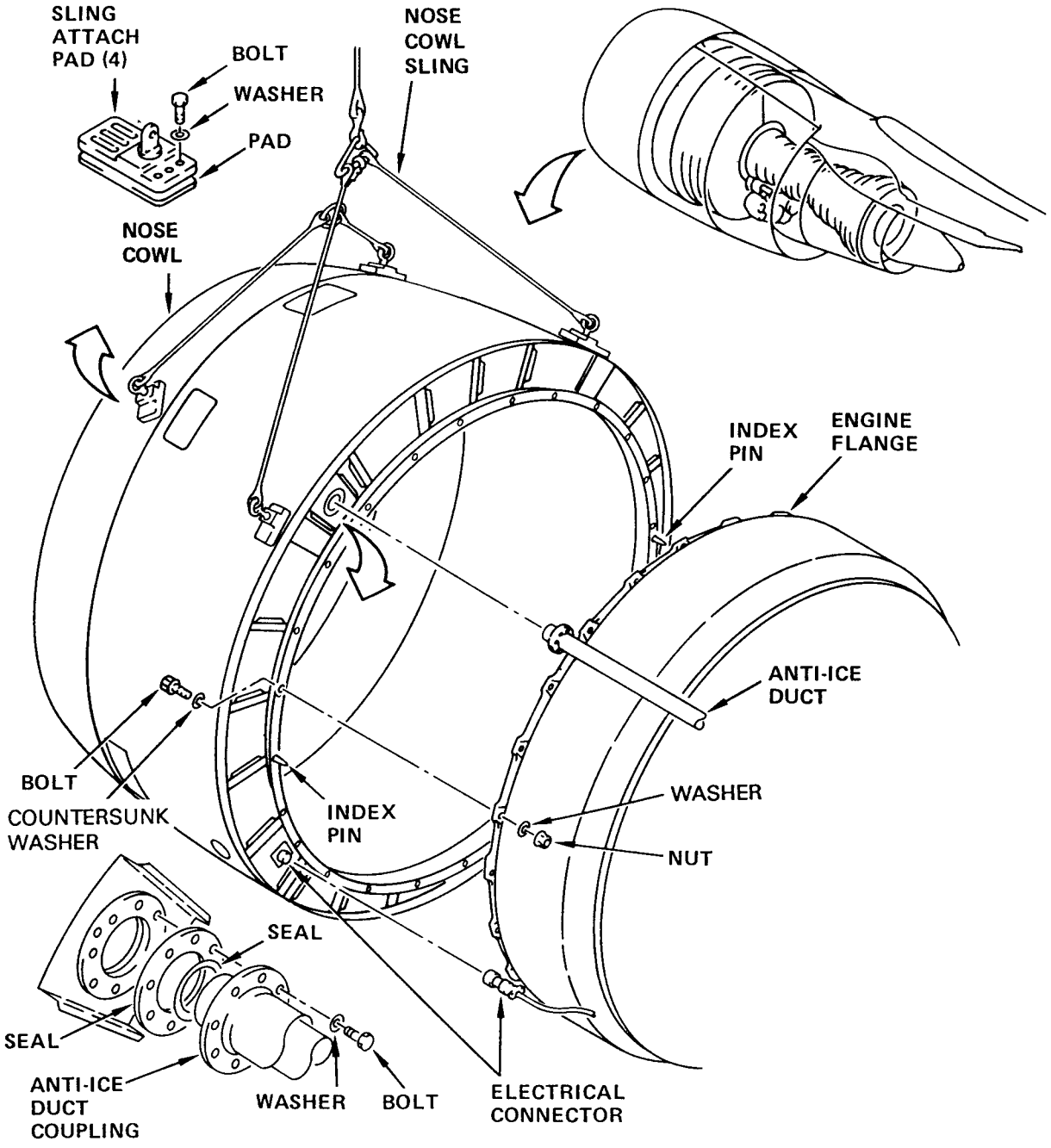
ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B. RSE1024	Nose Cowl Sling
C. RSE1021-3	Nose Cowl Dolly
D. Material No.C02-020	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-02, P. Block 501	Fan Cowl
- 71-13-03, P. Block 501	Fan Thrust Reverser Cowl
- 30-21-00, P. Block 401	Engine Air Intake Ice Protection

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open the fan cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401, 402)
(1)Disconnect electrical connector from nose cowl and install protective covers.
(2)Remove fan case forward anti-ice duct (Ref. 30-21-00, P. Block 401).
(3)Remove hoist point filler plugs from cowl and retain plugs for reinstallation.
(4)Attach sling, RSE1024A, to cowl, using sling attach pads, bolts and
R washers. TORQUE bolts between 30 and 36 lbf.in. (0.34 and 0.40 m.daN).
R Hoist until sling supports cowl weight.
(5)Remove bolts, washers and nuts attaching cowl to fan case.
(6)Pull cowl forward to disengage index pins, on cowl attach ring, from fan case flange.
(7)Position cowl on nose cowl dolly, RSE1021-3. Verify index pins on cowl attach ring do not interfere with support ring on dolly and secure cowl to dolly with bolts, washers and nuts.
(8)Remove cowl sling and install hoist point filler plugs.

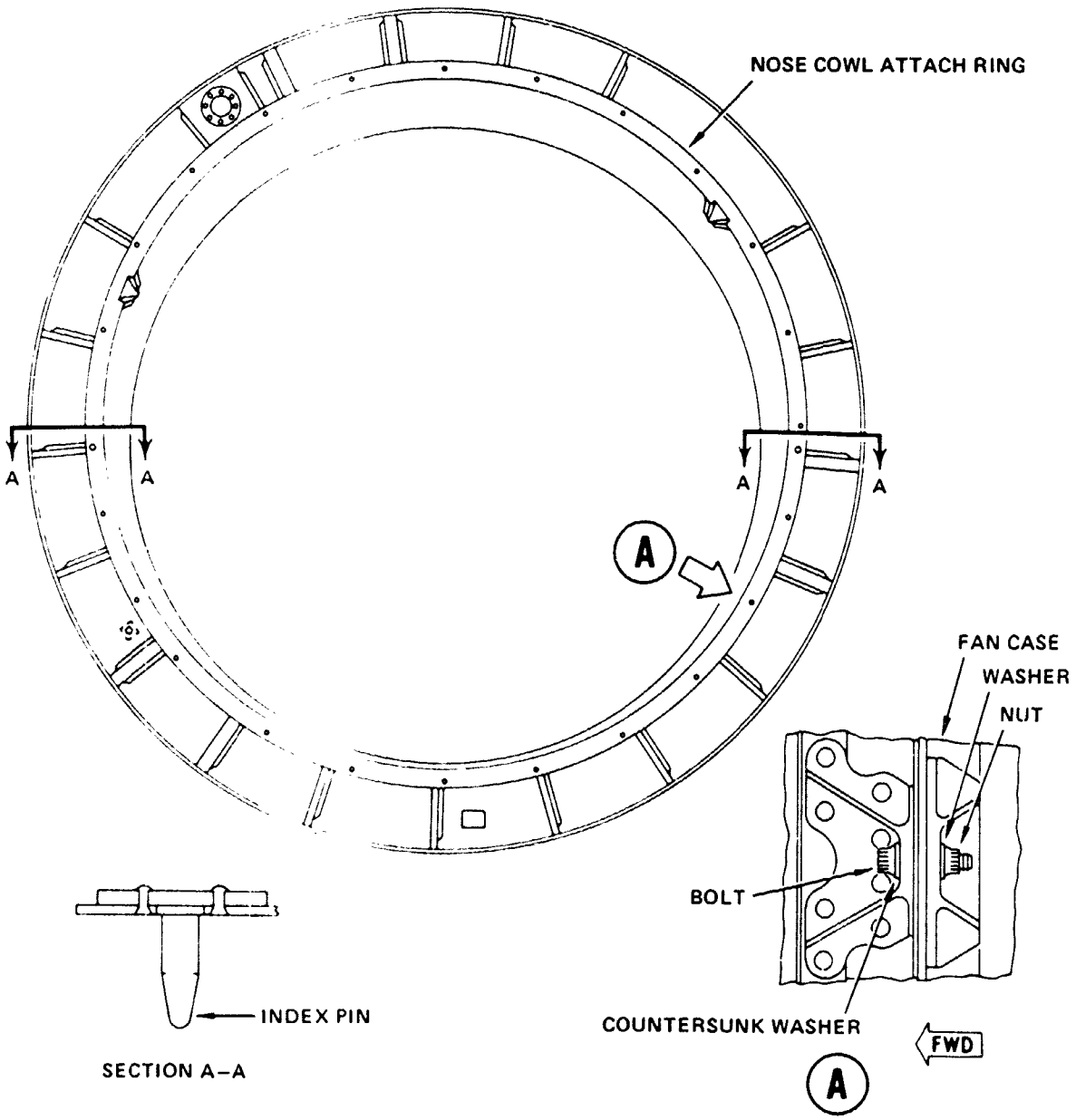
C. Installation (Ref. Fig. 401, 402)
(1)Remove hoist point filler plugs from nose cowl and retain plugs for reinstallation.
R (2)Attach sling, RSE1024A, to cowl, using sling attach pads, bolts



BM5 71 11 00 4 LAMO - 01

C2M-019-00

Nose Cowl
Figure 401



Nose Cowl Attach Ring
Figure 402

R and washers. TORQUE bolts between 30 and 36 lbf.in. (0.34 and
R 0.40 m.daN).
(3) Start at top of cowl and work down both sides, removing bolts, washers and nuts securing cowl to dolly.
(4) Pull cowl forward to clear index pins from interference with support ring dolly and remove cowl from dolly. Remove all protective covers from open ducts and ports.
(5) Hoist cowl to installation position and engage index pins of attach ring with fan case flange.
(6) Lubricate attaching bolts and washers and nut threads with CO2-020. Install bolts with heads facing forward and countersunk side of washer against bolt head. Tighten diametrically opposite bolts, starting at 3 then 9, 6 and 12 o'clock then move to adjacent bolts. TORQUE bolts to between 450 and 500 lbf.in. (5.08-5.65 m.daN). Retorque in same sequence.
(7) Remove sling and attach pads from cowl and install filler plugs.
R TORQUE filler plugs between 30 and 36 lbf.in. (0.34 and 0.40 m.daN).
(8) Install fan case forward anti-ice duct (Ref. 30-21-00, P. Block 401).
(9) Attach duct to nose cowl with bolts and washers (8 places). TORQUE bolts to 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(10) Connect electrical connector to nose cowl. Tighten connector fingertight plus one-eighth turn.
(11) Check, if necessary, the adjustment of the cowl doors latches (Ref. 71-13-02, P. Block 501 and Ref. 71-13-03, P. Block 501).

D. Close-Up
(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2) Remove safety clips and tags and close circuit breakers. Close fan cowl doors (Ref. 71-13-00, P. Block 301).

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1 & 2/START/CTL/WARN	1KG	335/R68
133VU	ENG1 & 2/IGNITION/SYS A	1JH	334/S72
133VU	ENG1 & 2/IGNITION/SYS B	2JH	333/T72
133VU	ENG1/REV/CTL	1KM	332/U69
133VU	ENG2/REV/CTL	2KM	331/V74

(2)Open fan cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Visual Inspection/Check

(1)Inlet cowl inlet lip structure

There are three types of damage zones for the inlet cowl inlet lip.

(a)Allowable damage zones (Ref. Fig. 601)

The allowable damage zones for the inlet cowl inlet lip are :

CL1 - Lip segment splice fastener areas and fastener areas of lip skin to inlet cowl forward bulkhead attachment.

CL2 - Lip skin areas within 1.60 in. (40.6 mm) of inlet cowl forward bulkhead.

CL3 - All areas of lip skin not in zones CL1 and CL2.

(b)Allowable damage limits

DESCRIPTION	CRACK	DENT/BUCKLE	SCRATCH/GOUGE	NICK
Zone CL1	A	B	D	E
Zone CL2	A	B	D	E
Zone CL3	A	C	D	E

NOTE : Any damage not described in the table must be repaired before next flight.

R NOTE : Refer to step below for allowable damage limits definition.

R (c)Allowable damage limits definition

R A: Adjacent cracks which are separated by less than the length of the shortest cracks should be treated as one crack.
Cracks less than 3.00 in. (76.2 mm). Drill stop hole (No. 30 drill) at both ends of crack. Check weekly or every 25 cycles, whichever is less. If crack grows beyond stop holes, stop drill new crack and install external patch. Check every "A" check. Do not remove external patch for inspection. Repair at "C" check.

R B: Buckled flange 5.00 in. (127.0 mm) maximum length. Check at "A" check. Repair at next "C" check.

R C: 5.00 in. (127.0 mm) maximum diameter. Depth of dent must not be more than 10 percent of diameter. Not allowed within 1.60 in. (40.6 mm) of forward bulkhead. Minimum 10.00 in. (254.0 mm) from other defects.

R D: 10.00 in. (254.0 mm) long in any direction. If depth exceeds 25 percent of material thickness or is wider than 0.10 in. (2.5 mm), consider as crack. Minimum 10.00 in. (254.0 mm) separation from other defects.

R E: Consider as a crack if deeper than 25 percent of material thickness or wider than 0.10 in. (2.5 mm).

(2)Inlet cowl outer barrel structure

There are six types of damage zones for the inlet cowl outer barrel.

(a)Allowable damage zones (Ref. Fig. 602, 603)

The allowable damage zones for the inlet cowl outer barrel are :

C1 - Forward barrel land and aft barrel land, interfacing with the forward and aft inlet cowl bulkhead.

C2 - Horizontal lands of upper barrel half and lower barrel half in splice areas.

C3 - Circumferential frames (containing honeycomb core).

C4 - Access panel frames.

C5 - Anti-ice air vent frame (lower panel only).

C6 - Outer barrel panel composite skins, bound by frames, bulkhead lands, splice lands, and access panel frames. Includes all areas not covered in zones C1 through C5.

(b)Allowable damage limits

DESCRIPTION	ABRASION	CRACK	DISBOND	DELAMINATION	SCRATCH/ GOUGE	HOLE
Zone C1	A		C		D	
Zone C2	A		C		D	
Zone C3	A	B	C		D	E
R Zone C4	A				D	
Zone C5	A				D	
Zone C6	A	B		F	D	E

DESCRIPTION	ABRASION	CRACK	DISBOND	DELAMINATION	SCRATCH/ GOUGE	HOLE

NOTE : Any damage not described in the table must be repaired before next flight.

R NOTE : Refer to step below for allowable damage limits definition.

R (c)Allowable damage limits definition

R A: Abrasion damage allowed to face surface only. Fibers must no be damaged. Treat as scratch if fibers are damaged. Apply tape, record and check at "A" check. Replace *tape if peeled.

R B: Maximum crack length 3.00 in. (76.2 mm) in any direction, more than 1.00 in. (25.4 mm) from reinforced areas. 10.00 in. (254.0 mm) separation from other cracks, holes, and disbonds. Five cracks maximum per barrel half. Cracks wider than 0.10 in. (2.5 mm) are to be treated as holes. Apply tape, record and check at next "A" check. Repair at "C" check.

R C: 1.00 in. (25.4 mm) maximum diameter in stiffeners and lands. 10.00 in. (254.0 mm) minimum separation from other defects. 5 disbonds maximum in area. Record and check at "A" check. Repair at "C" check.

R D: Maximum depth 0.010 in. (0.25 mm) over 10.00 in. (254.0 mm) length. Apply tape, record and check at next "A" check. Replace *tape if peeled or damaged.

R E: 3.00 in. (76.2 mm) maximum diameter in outer barrel. 1.00 in. (25.4 mm) from reinforced areas. 0.50 in. (12.7 mm) maximum in stiffeners and lands. 10.00 in. (254.0 mm) minimum separation from other defects. 5 holes maximum in area. Apply tape, record and check at next "A" check. Repair at "C" check.

R F: 5.00 in. (127.0 mm) maximum diameter, 1.00 in. (25.4 mm) from reinforced areas. 10.00 in. (254.0 mm) minimum separation from other defects. 5 delaminations maximum in area. Record and check at "A" check. Repair at "C" check.

*Tape - Commonly referred to as "speed tape", 3M Type 425 or equivalent.

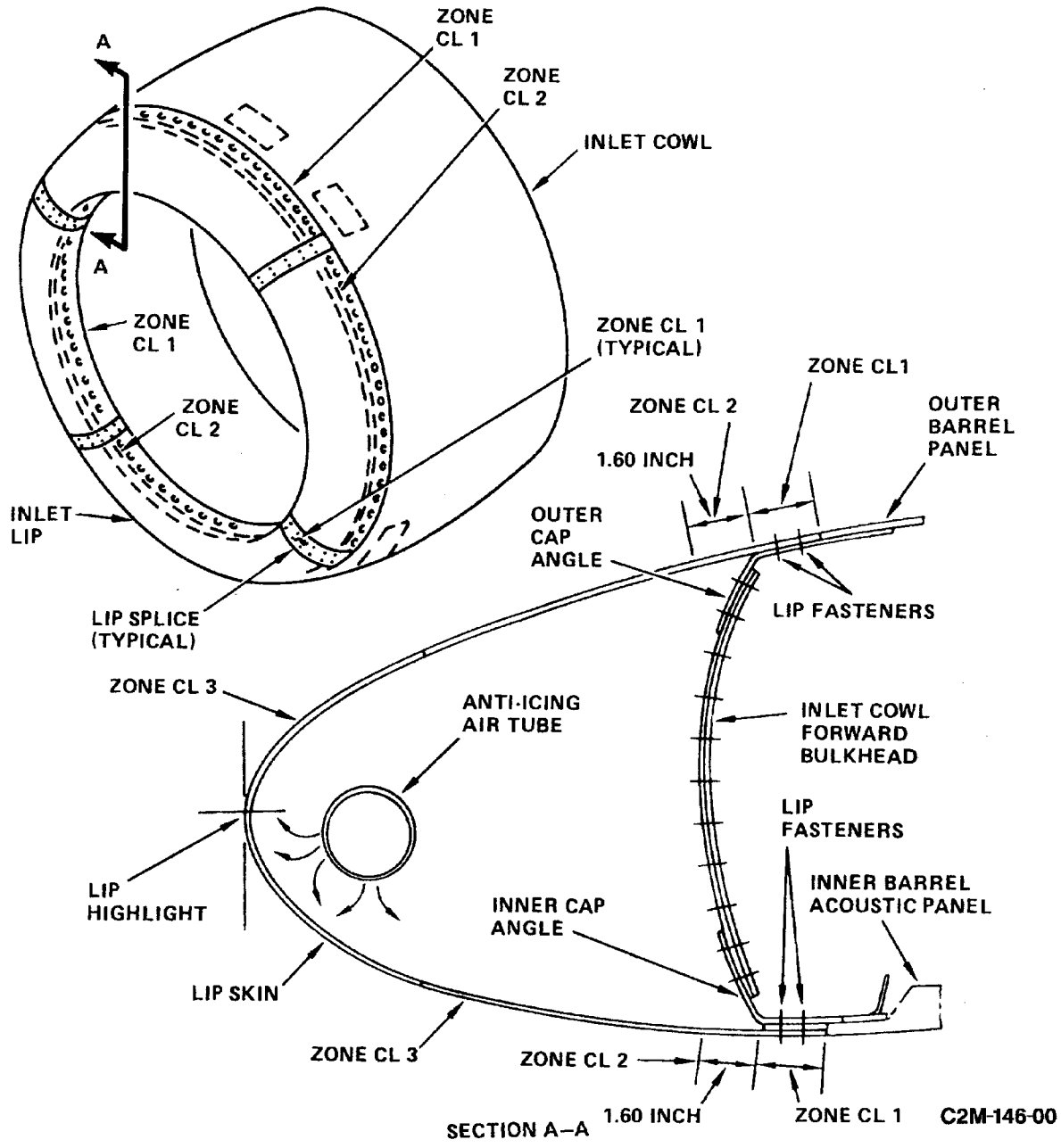
(3)Inlet cowl inner barrel structure

There are six types of damage zones for the inlet cowl inner barrel.

(a)Allowable damage zones (Ref. Fig. 604)

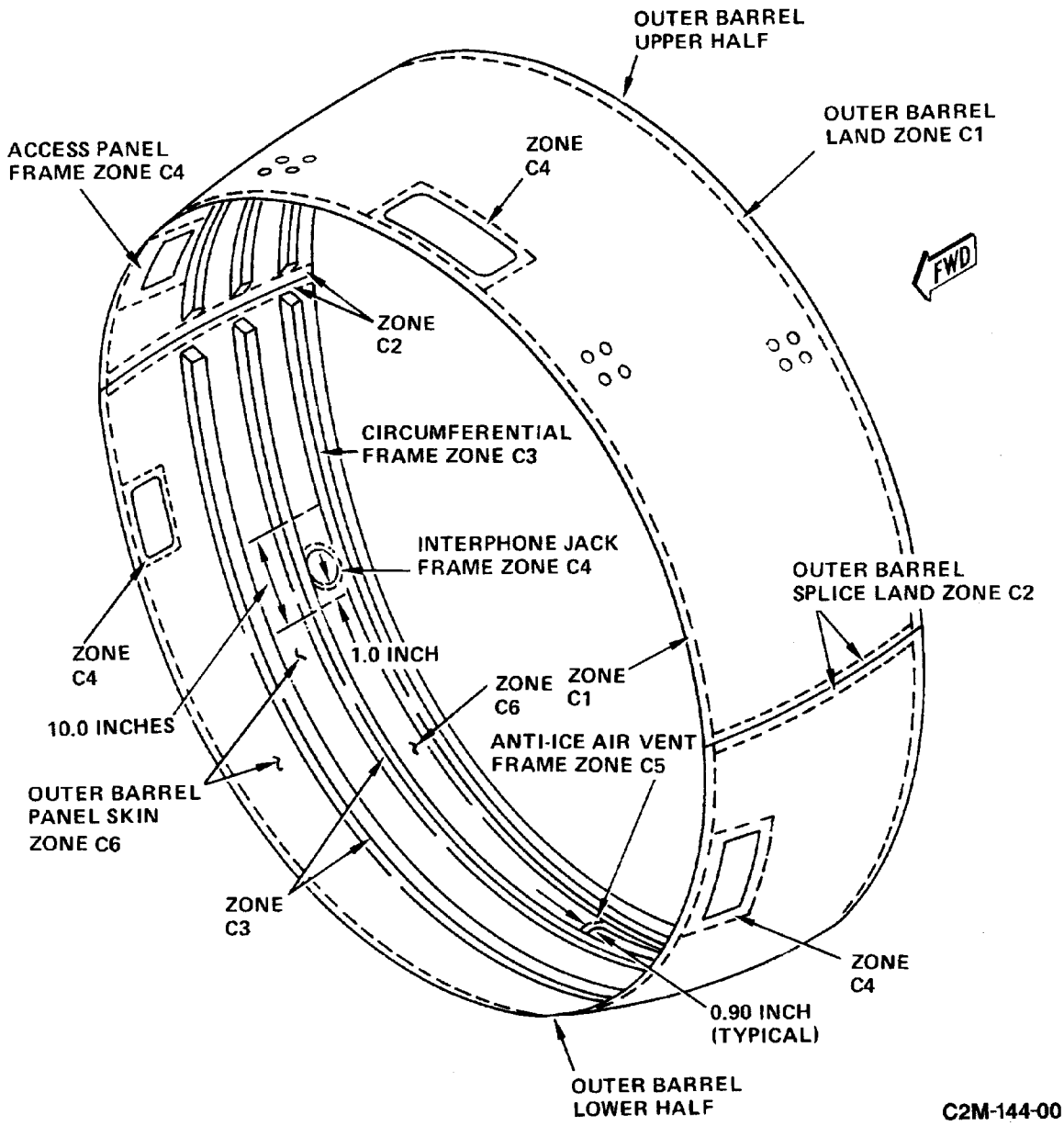
The allowable damage zones for the inlet cowl inner barrel are :

CA1 - Woven wire acoustic face sheet overlay.
CA2 - Perforated inner face sheet.
CA3 - HFT core.
CA4 - Nonperforated outer face sheet.
CA5 - Riveted joint.
CA6 - Bonded (nonriveted) joint.



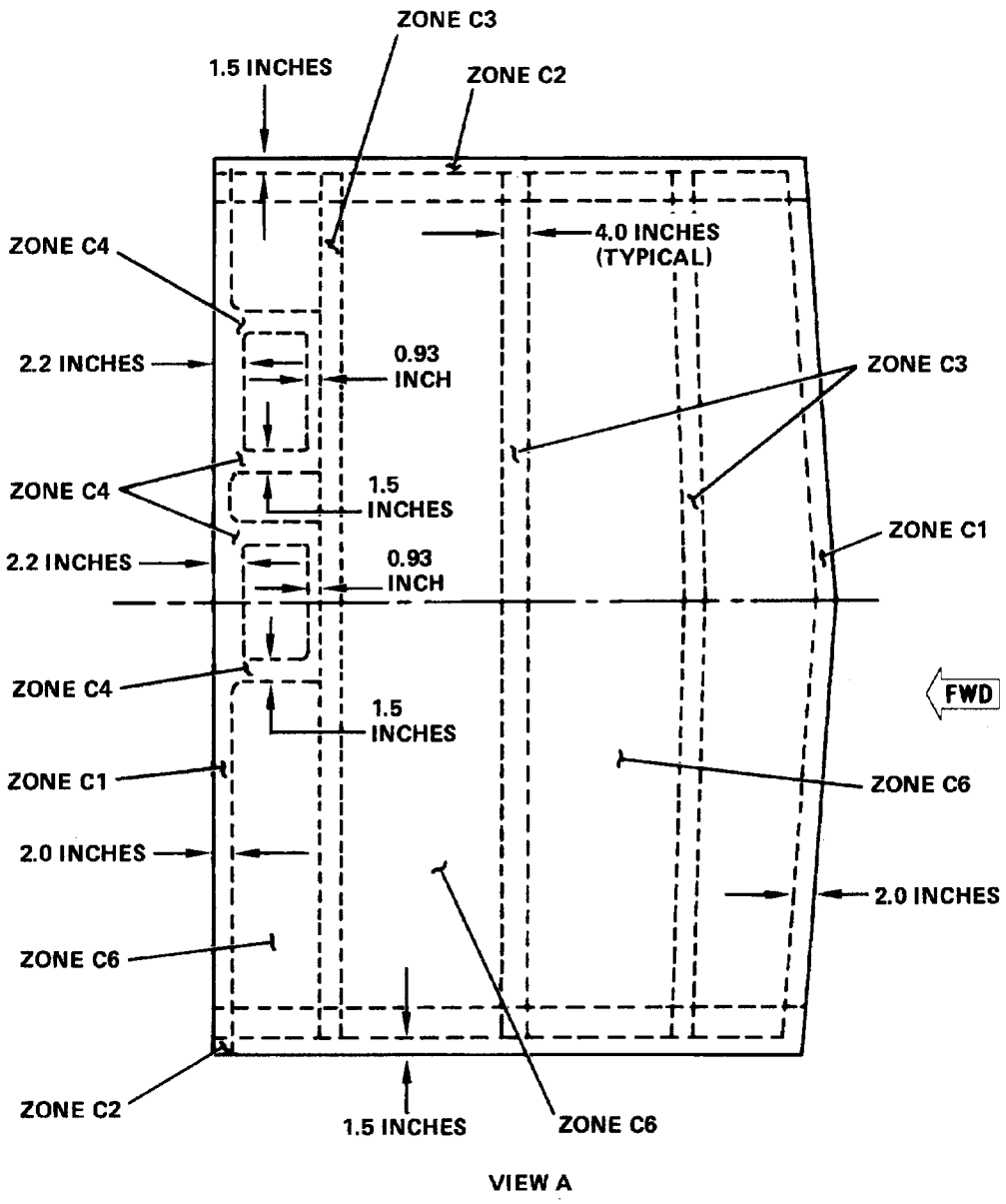
BM5 71 11 00 6 LAMD 01

Aluminum Inlet Lip Structure
Figure 601



BM5 71 11 00 6 LCM0 02

Inlet Cowl Outer Barrel Damage Zones
Figure 602



BM5 71 11 00 6 LEMO 00

Inlet Cowl Outer Barrel Damage Zones
Figure 603

(b)Allowable damage limits

DESCRIPTION	DISBOND	DENT	GOUGES	RIP/TEAR	NICK	SCRATCH
Zone CA1				F		
Zone CA2	A	D	E		G	H
Zone CA3	A					
Zone CA4	A	D			G	H
Zone CA5	B					
Zone CA6	C					

NOTE : Any damage not described in the table must be repaired before next flight.

R NOTE : Refer to step below for allowable damage limits definition.

R (c)Allowable damage limits definition

R A: 50 sq. in. (32258 sq. mm) area maximum, must be separated from other disbond or voids by four times maximum dimension of disbond. Must not be opposite void or disbond on other face sheet. Maximum disbonded length for non-riveted joint is 15 percent of joint length.

R B: A total maximum delamination of six linear in. (152.4 mm) is allowed.

R C: Maximum disbond length is 15 percent of joint length. The disbond must not extend from one edge of the part to opposite edge. There must be a minimum of 0.12 in. (3.1 mm) between disbond and edge of part. Check at "A" check. Repair at "C" check.

R D: 1.50 in. (38.1 mm) minimum distance from reinforced area or edge of honeycomb. 3.00 in. (76.2 mm) minimum separation between dents. Check at "A" check. Repair at next "C" check.

R E: Length 1.00 in. (25.4 mm) maximum, width 0.10 in. (2.5 mm) maximum, depth 0.10 in. (2.5 mm) maximum, radius 0.05 in. (1.3 mm) minimum. 1.50 in. (38.1 mm) minimum separation from reinforced area or edges of honeycomb. Minimum of 3.00 in. (76.2 mm) separation from other defects. Check at "A" check. Repair at "C" check.

R F: 1.50 in. (38.1 mm) minimum distance from reinforced area or edge or
R edge of honeycomb. Length 0.75 in. (19.1 mm) maximum, depth 0.010 in.
R (0.25 mm) maximum. Minimum 2.00 in. (50.8 mm) separation from other
R defects.

R G: Maximum 1.50 in. (38.1 mm) long and 0.005 in. (0.13 mm) deep.
R Minimum of 1.50 in. (38.1 mm) from reinforced area or edge of

R honeycomb. Minimum 2.00 in. (50.8 mm) separation from other
R defects.

R H: Maximum 1.5 in. (38.1 mm) long and 0.005 in. (0.130 mm) deep. Minimum of 1.5 in. (38.1 mm) from reinforced area or edge of honeycomb. Minimum 2 in. (50.8 mm) separation from other defects.

(4)Inlet cowl bulkhead structure

There are five types of damage zones for the inlet cowl bulkhead.

(a)Allowable damage zones (Ref. Fig. 605)

The allowable damage zones for the inlet cowl bulkhead are :

CB1 - Forward bulkhead panel webs.
CB2 - Aft bulkhead panel webs.
CB3 - Stiffeners, cap angles, doublers or fittings.
CB4 - Forward bulkhead fastener joints.
CB5 - Aft bulkhead fastener joints.

(b)Allowable damage limits

DESCRIPTION	CRACK	DENT/BUCKLE	SCRATCH/GOUGE	NICK
Zone CB1	B	D	E	F
Zone CB2	B	D	E	F
Zone CB3	A	C	E	F
Zone CB4	A	C	E	F
Zone CB5	A	C	E	F

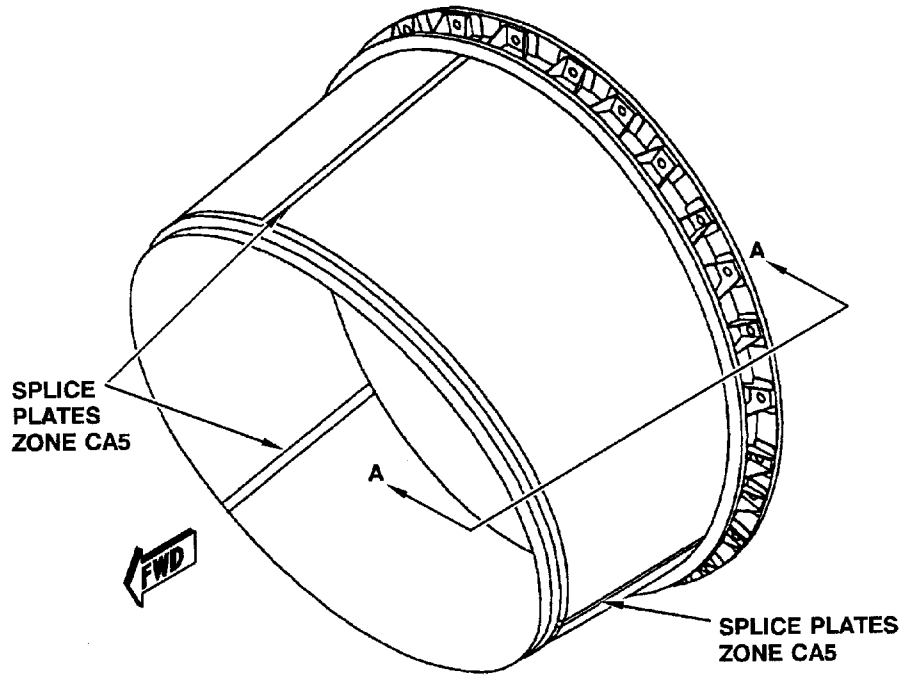
NOTE : Any damage not described in the table must be repaired before next flight.

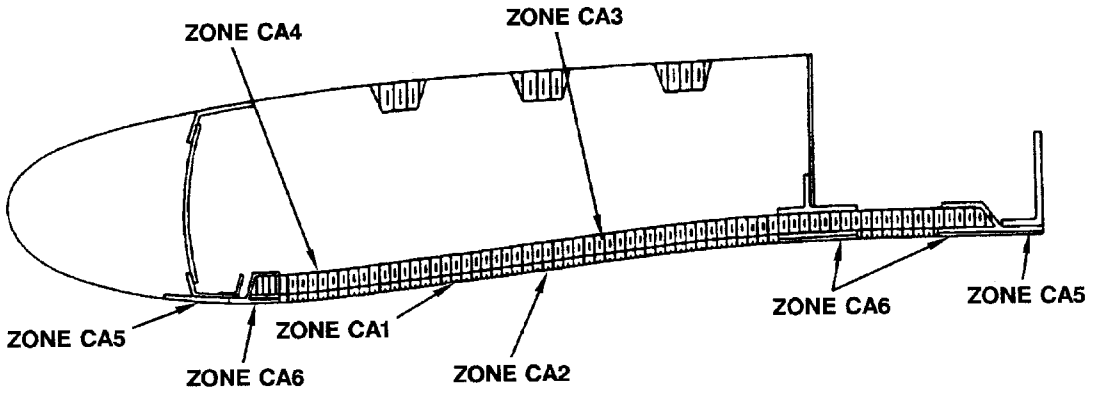
R NOTE : Refer to step below for allowable damage limits definition.

R (c)Allowable damage limits definition

R A: Cracks between two adjacent fasteners in a joint of 10 or more fasteners and not within 5.00 in. (127.0 mm) of a stiffener. Minimum 10.00 in. (254.0 mm) separation from other defects. Cracks must be stop drilled before next flight.
Cracks less than 1.00 in. (25.4 mm) long between fasteners must be stop drilled and checked at each "A" check.
Cracks more than 1.00 in. (25.4 mm) and less than 3.00 in. (76.2 mm) long must be stop drilled and repaired at next "A" check.
Cracks in stiffeners less than 1.00 in. (25.4 mm) long in bend area or less than 25 percent of flange width. Stop drill and check at "A" check. Repair at next "C" check.

R B: Cracks between two adjacent fasteners in a joint of 10 or more fasteners. Minimum of 10.00 in. (254.0 mm) from other defects. Check at "A" check. Repair at next "C" check.





SECTION A-A

C2M-148-00

BM5 71 11 00 6 LGMO 00

Inlet Cowl Acoustic Panel and Bonded
Acoustic Panel Structures
Figure 604

R C: Buckled flange 5.00 in. (127.0 mm) maximum length. Check at "A" check. Repair at next "C" check.

R D: 5.00 in. (127.0 mm) maximum diameter. Depth of dent must not be more than 10 percent of diameter. Not allowed within 1.60 in. (40.6 mm) of forward bulkhead fastener joint. Minimum 10.00 in. (254.0 mm) from other defects.

R E: 10.00 in. (254.0 mm) long in any direction. If depth exceeds 25 percent of material thickness or is wider than 0.10 in. (2.5 mm), consider as crack. Minimum 10.00 in. (254.0 mm) separation from other defects.

R F: Consider as a crack if deeper than 25 percent of material thickness or wider than 0.10 in. (2.5 mm).

(5)Inlet cowl mounting hardware for :

INSPECTION/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(a)Corrosion	None permitted	Replace before flight
(b)Cracks/Ruptures	None permitted	Replace before flight

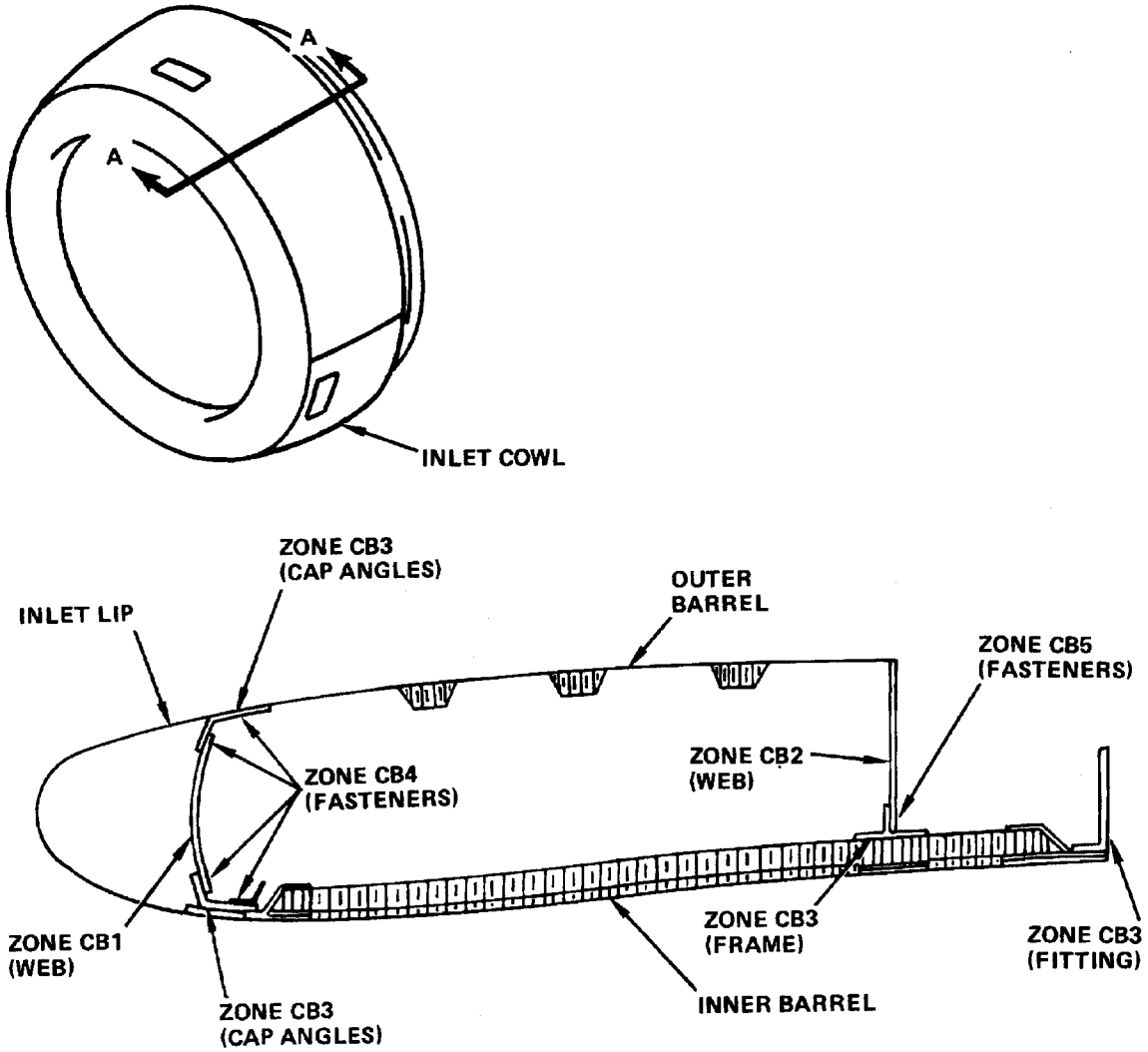
C. Close-Up

(1)Remove access platform.

R (2)Make certain that working area is clean and clear of tools and
R miscellaneous items of equipment.

R (3)Close fan cowl doors (Ref. 71-13-00, P. Block 301).

R (4)Remove safety clips and tags and close the appropriate circuit breakers.



BM5 71 11 00 6 LJMO 00

Titanium Bulkhead Structures
Figure 605

COWL DOORS - DESCRIPTION AND OPERATION

1. Fan Cowl Doors

(Ref. Fig. 001, 002, 003)
(Ref. Fig. 004, 005)

A. General

The fan cowl door assemblies are engine to engine interchangeable units enclosing the engine fan case between the nose cowl and fan reverser cowl. Each assembly is supported by three hinges at the pylon and latched along the bottom splitline with three tension hook latches.
The cowl panels are designed to be structurally adequate when any one of the latches is unlatched, except in a nacelle over-pressurization condition due to a pneumatic duct failure.
Two lands are provided on the fan cowl. One at the forward end for nose cowl junction and the other at the aft end for fan thrust reverser junction. The doors have to be opened in order to open the fan reverser.
Two hold open rods support each door in the open position. Opening of these cowls provide access to all the hardware mounted on the fan outer case.

B. Description

The fan cowls are bonded Kevlar/Graphite epoxy skins and aluminum honeycomb sandwich construction. The internal pressure loads and external air loads are reacted through the honeycomb structure and transmitted into the pylon through the hinge fittings.
A bulb-type seal is provided along the lower longitudinal splitline and a sheet metal seal (stainless steel) is provided along the upper longitudinal splitline.

C. Opening/Closing

The fan cowl doors may be opened to a maximum of 57° and two stops are provided on the telescopic hold-open rods to maintain the doors in either 40° or 55° position.
The fan cowl cannot be physically latched if the fan reverser latch is not latched

D. Access and Pressure Relief Door-Vents

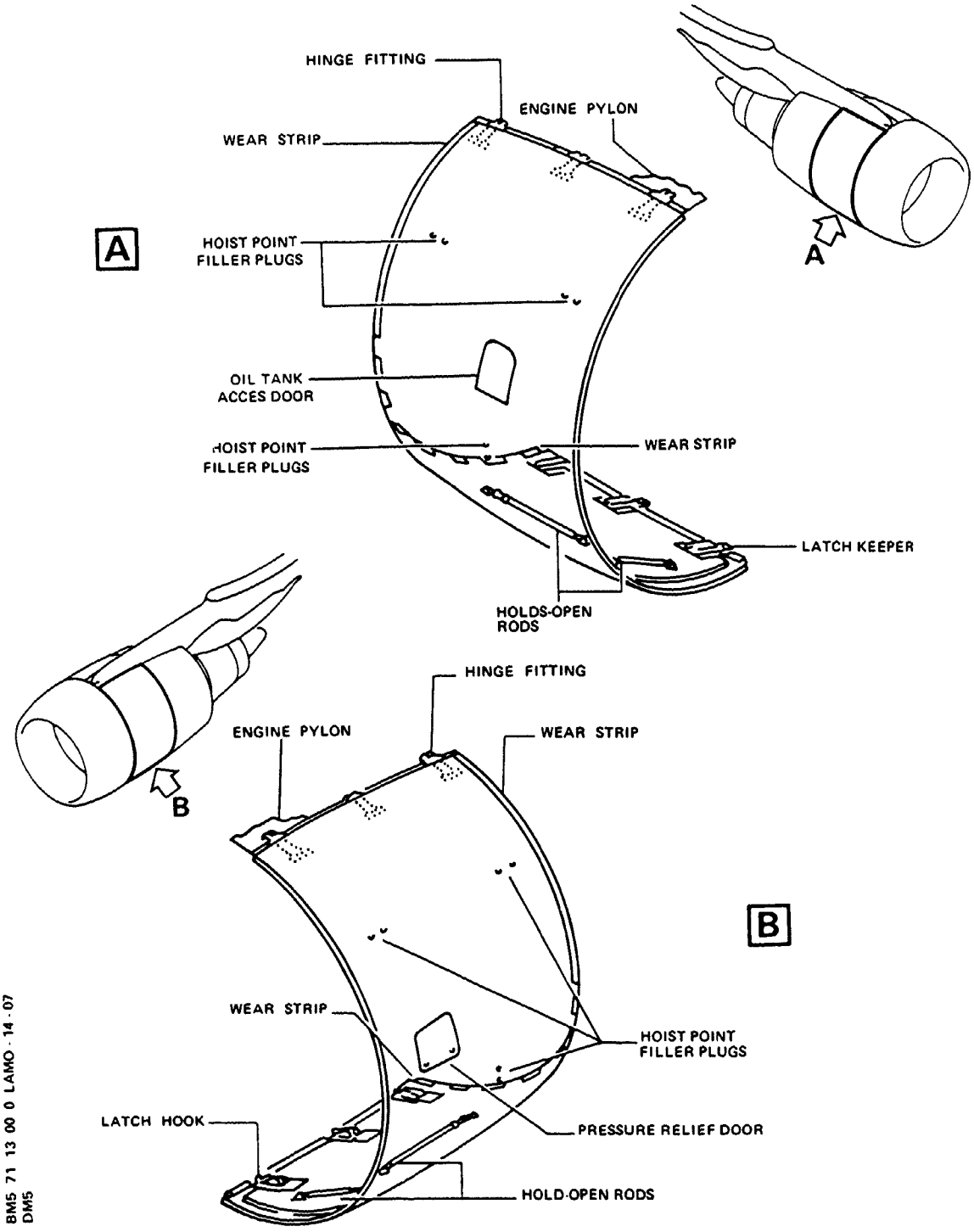
The following access doors are provided in the fan cowl :

(1)Left fan cowl
- Pressure relief door.

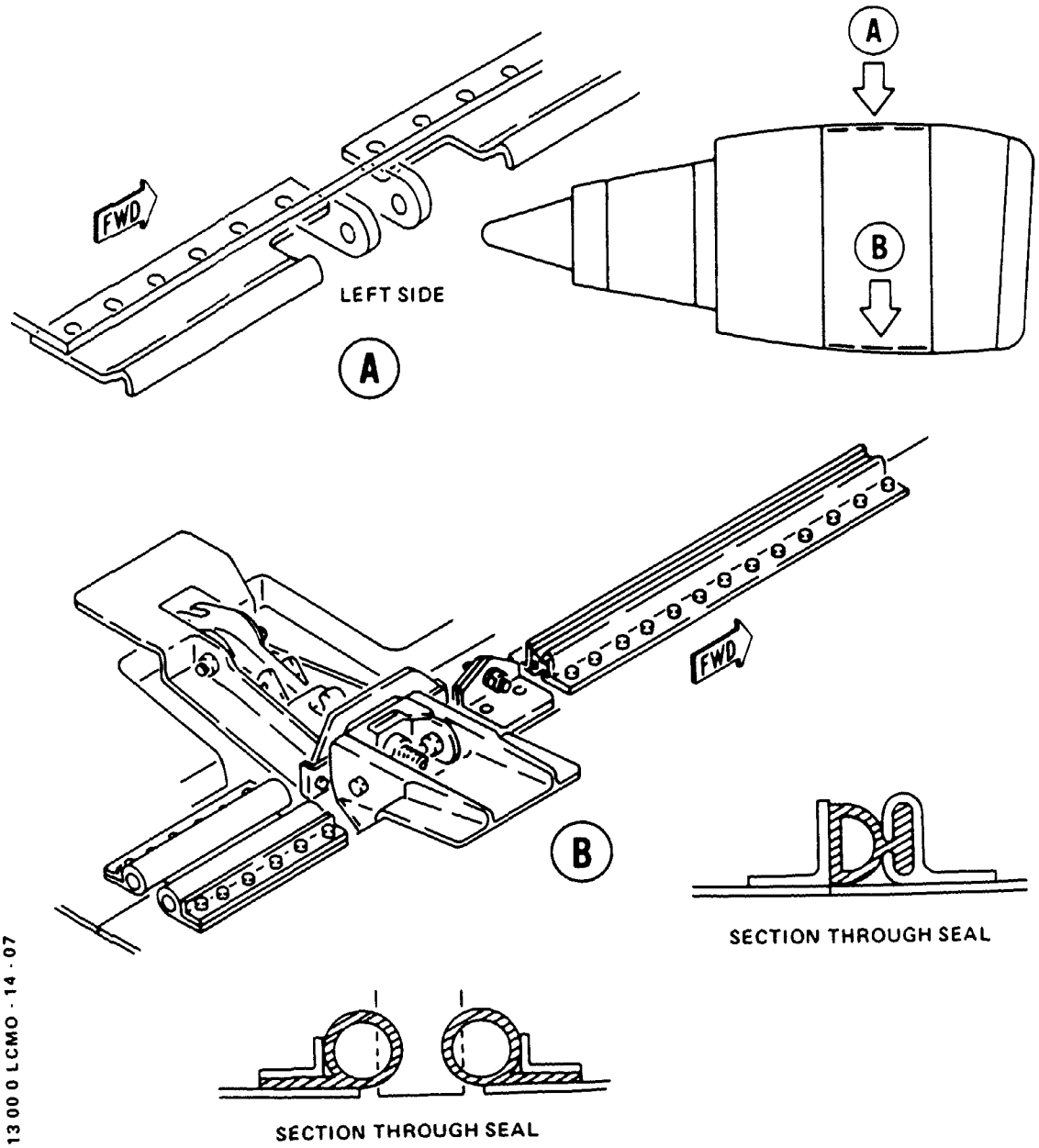
(2)Right fan cowl
- Engine oil tank.

E. Fan Cowl Installation/Removal

Three hoist points are provided on the top portion of the cowl for GSE installation.

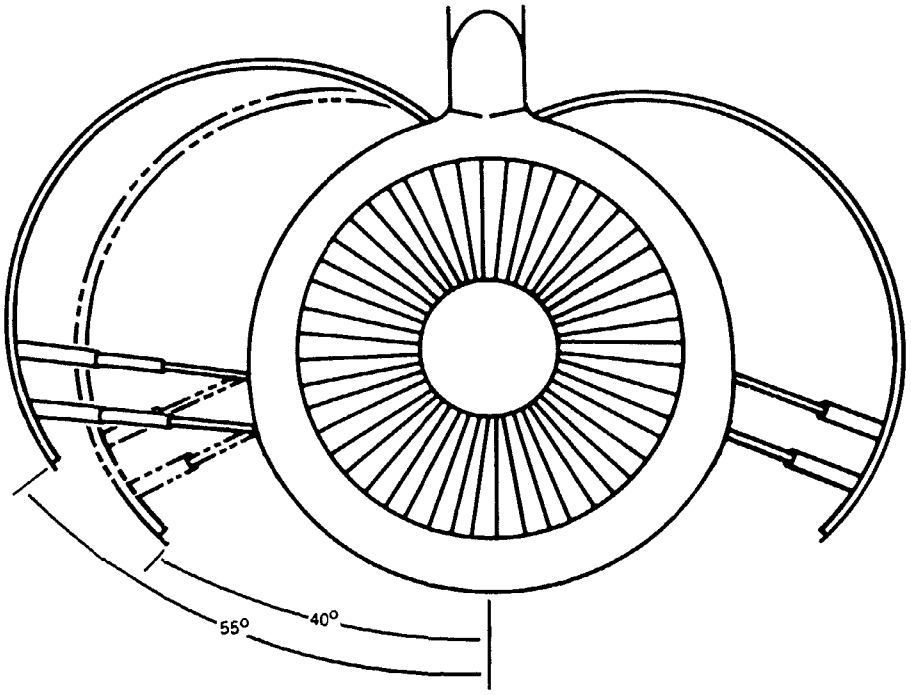


Fan Cowl Doors
Figure 001



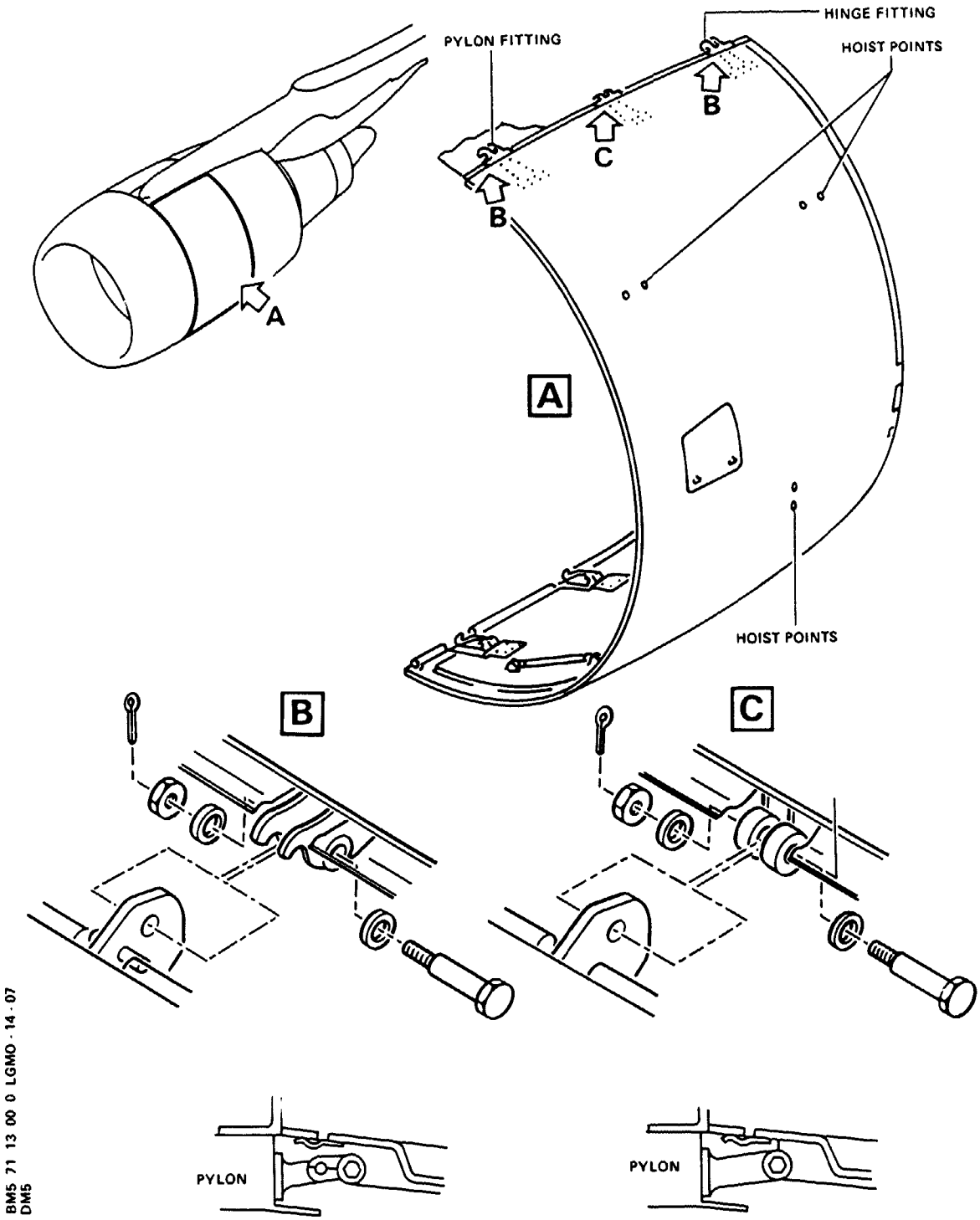
BM5 71 13 00 0 LCMO - 14 - 07
DM5

Fan Cowl Door Seals
Figure 002

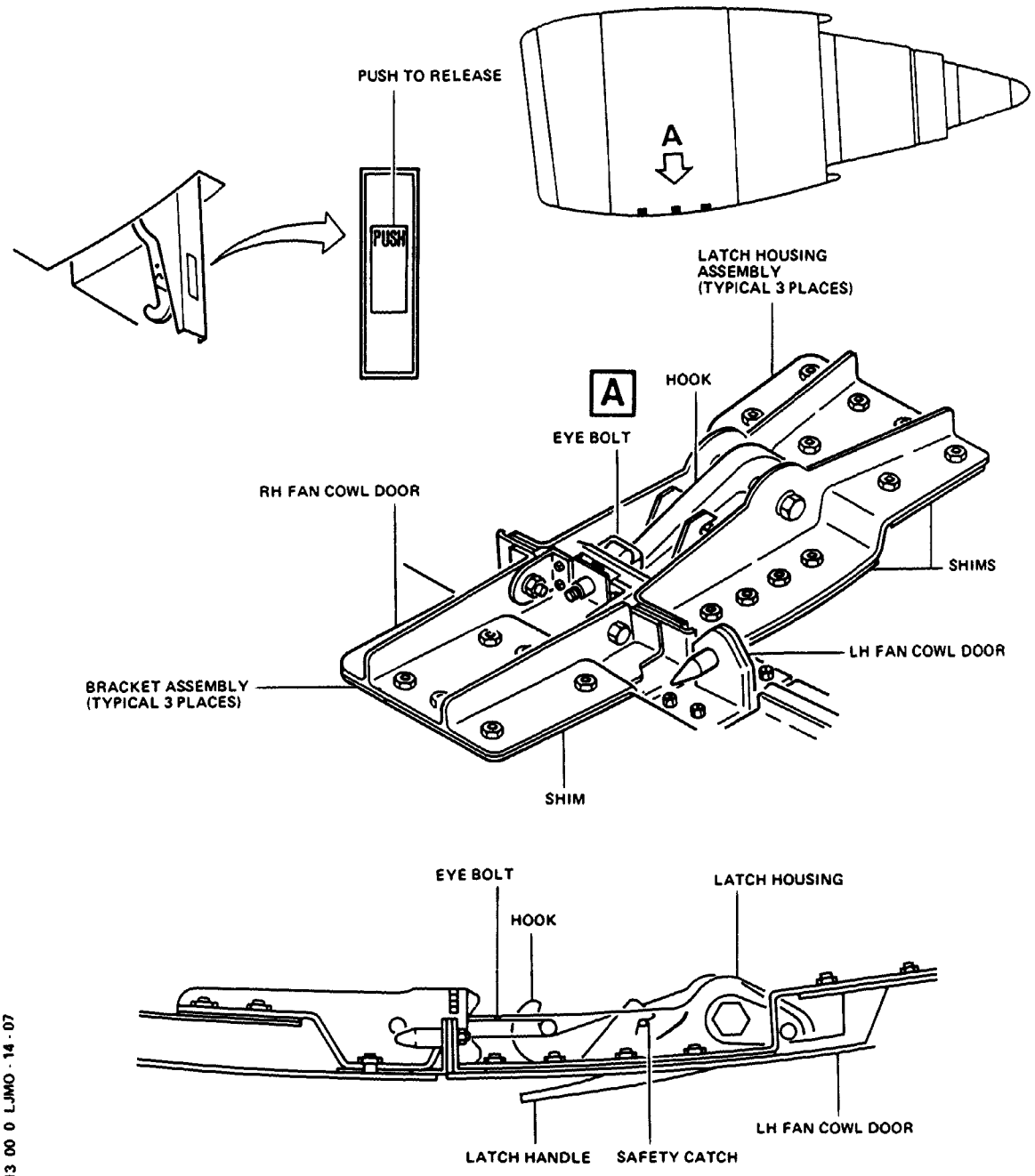


BM5 71 13 00 0 LEMO-14-08
DM5

Fan Cowl Door Opening
Figure 003



Fan Cowl Door Hinges
Figure 004



BM5 71 13 00 0 LJMO - 14 - 07
DM5

Fan Cowl Door Latches
Figure 005

2. Fan Reverser (Ref. Fig. 006, 007, 008)

A. General

The fan reverser is a bifurcated assembly of two halves forming the fan exhaust duct and nozzle, enclosing the engine between the fan frame and the core cowling, and containing the mechanism for reversing the flow of the fan exhaust flow during aircraft landing. Each reverser half is supported by three hinges at the pylon and latched along the bottom split-line with three tension hook latches.

The fan reverser assembly is designed to be structurally adequate with one pylon hinge or one latch failed.

The fan reverser is composed of various metallic and non-metallic materials.

Opening of the fan reverser will provide access to the reverser line Replaceable Units, as well as access to the hardware mounted on the HP compressor and combustion chamber.

FAN REVERSER MATERIAL

COMPONENT	MATERIAL
(1)Fixed Structure	
Outer Structure	2024 Aluminum
Deflectors	
- Skewed Vanes	Aluminum A356
- Straight Vanes	Aluminum A356
Fire Protection	Ablative Paint + insulating blankets
Duct Side Walls	
- Face Skins	2024 Aluminum
- Core	5056 Aluminum
Inner cowl	
- Perforated Face Skin	2024 Aluminum
- Back Skin	2024 Aluminum
- Core	5056 Aluminum
- Fire Barrier/Insulation	Silicone
Pylon Hinges	2219 Aluminum
Forward Latch Ring	7075 Aluminum
(2)Translating Cowl	
Outer Bondment	
- Face Skins	Graphite Epoxy
- Core	Nomex
- Perforated Inner Skin	Fiberglass Epoxy
Inner Bondment	
- Face Skins	Graphite Epoxy
- Core	Nomex
- Perforated Inner Skin	Fiberglass Epoxy
Hinges and Fittings	2024 Aluminum
(3)Blocker Doors	
- Backpan	Graphite Epoxy and

FAN REVERSER MATERIAL

COMPONENT	MATERIAL
	Fiberglass Epoxy
- Core	Nomex
- Perforated Face Skin	Fiberglass Epoxy
- Hinges	A356 Aluminum
- Clevis Housing	A356 Aluminum
- Links	2219 Aluminum

B. Description

Each reverser half assembly includes a fixed structure and a translating cowl.

NOTE : Only the cowling function is described in this chapter. For reverser description refer to chapter 78-30-00.

(1)Fixed structure

The outer fixed structure is of conventional riveted sheet metal and machined extrusion construction, while the duct side walls and inner cowl are honeycomb sandwich bondments.

Fire shields are located in the upper and lower portions to separate the core compartment from the outer compartment under the fan cowl. A filled silicone coating establishes a fireproof coating on the inner surface of the inner cowl and the duct sidewalls. Bulb type seals are provided between the fixed structure and the forward circumference of the translating cowl inner bondment and the tee hinge is sealed with a mastic flexible seal. The outer forward face of the fixed structure provides a sealing surface for fan case mounted seals and the inner forward face provides a seal which mates with a fan frame land.

(2)Translating cowl assembly

The translating cowl, blocker doors and acoustic suppression panels are fabricated of non-metallic composite sandwich panels.

C. Acoustic Provisions

The fan duct inner and outer walls are acoustically treated, the treatment being integral to the blocker doors, translating cowl and the inner cowl bondments. The inner cowl and the translating cowl are single layer with the entire acoustic treated flowpath skin perforated. The acoustic treated areas are covered with wire mesh ; this includes transcowl and blocker doors. The total acoustic area is approximately 130 square feet.

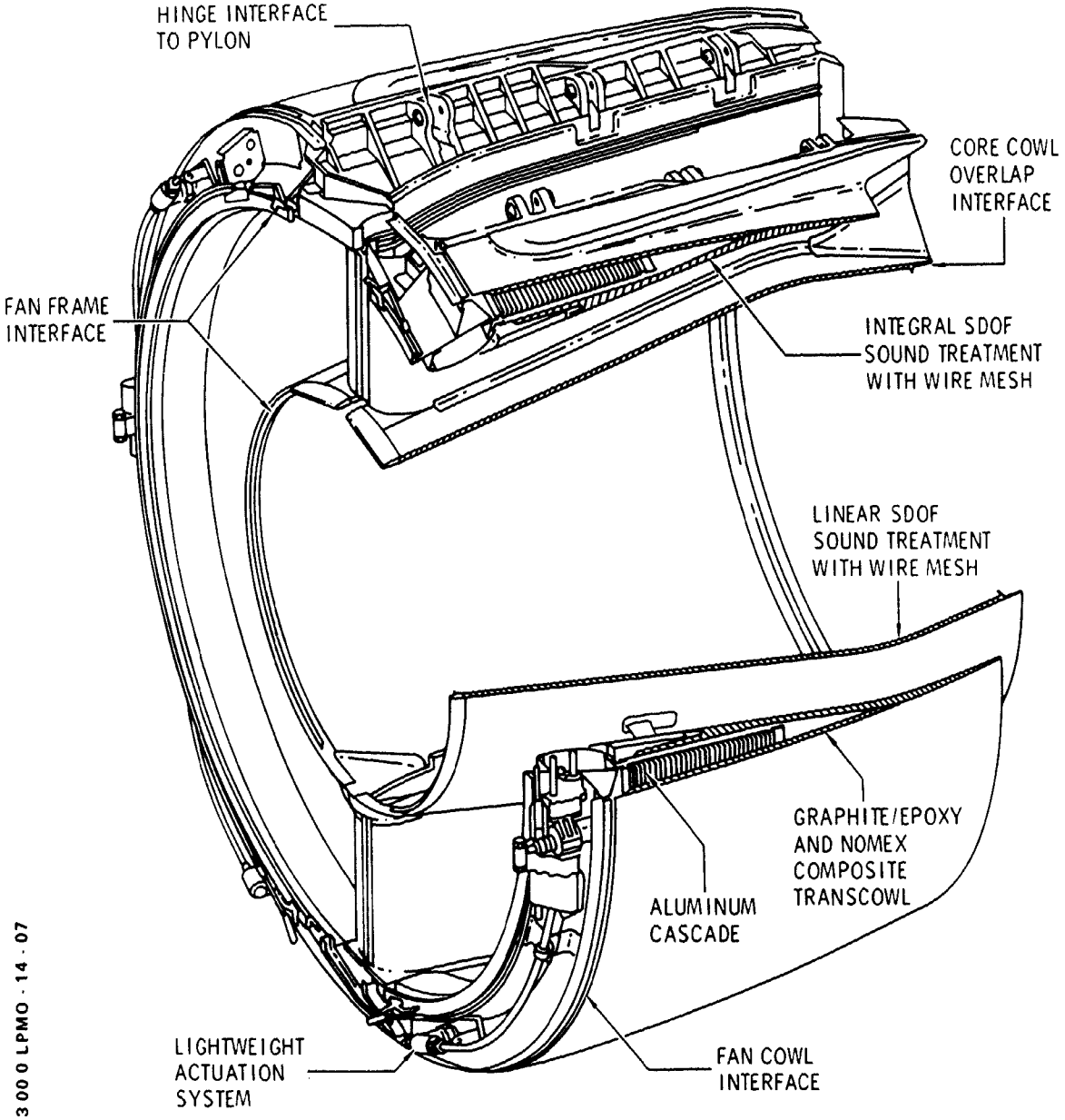
D. Opening/Closing

Each fan reverser half is opened by a hydraulic actuator which is operated with fluid from ground support equipment (GSE). The GSE connection is located on the fan case approximately on the nacelle centerline. When closing the fan reverser halves, the GSE is reconnected to each half and the fluid is returned to the GSE during the closing action. Each half engages a grooved ring at both the inner and outer flow surface on the engine fan case and is latched to the fan case at the upper and lower extremities of each reverser half forward flange.

Two hold open positions are provided, a max of 45° and a intermediate position of 35°, by using one engine fan case attach bracket and adjusting the hold open rod length. A hydraulic interlock is provided which prevents the reverser from being closed when the core cowl doors are open. A schematic of the hydraulic opening system is shown in Figure (Ref. Fig. 009).

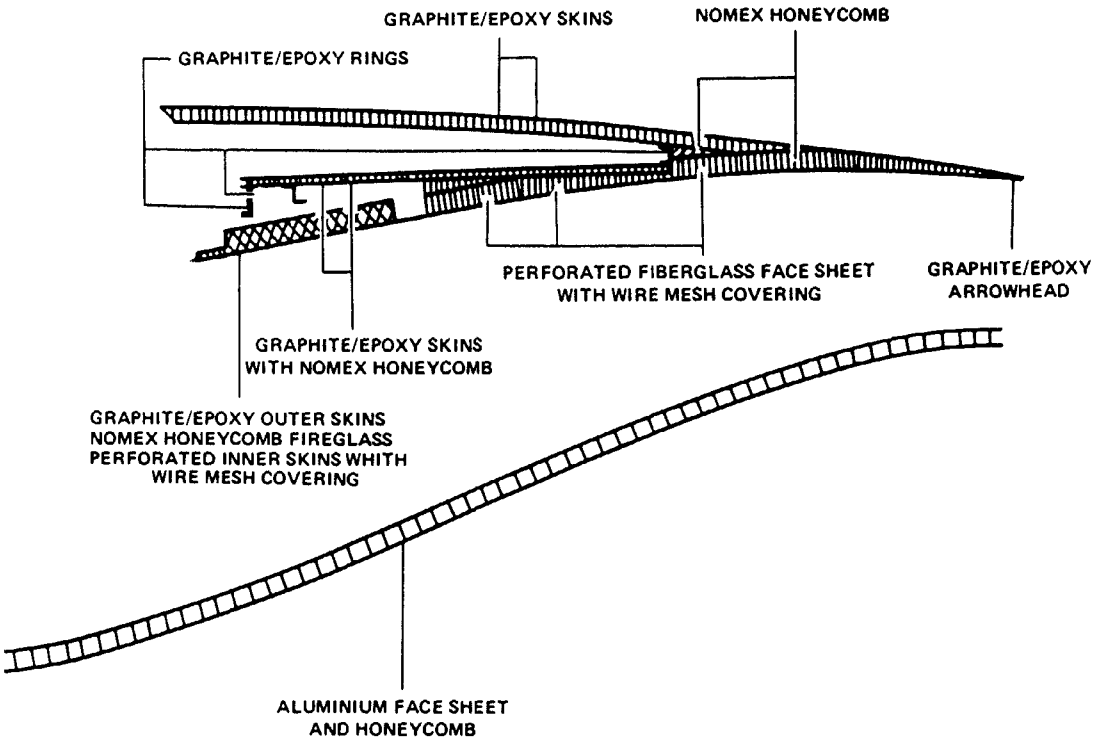
E. Pressure Relief Doors
A pressure relief door is located in the outer fixed structure along the bottom centerline between the lower duct sidewalls. This door is designed to prevent excessive pressure build-up in the core compartment in case of a pneumatic duct failure.

F. Access Doors (Ref. Fig. 010, 011)
Provisions are made for access to :
- IDG reset handle and IDG oil tank.
- hydraulic filter bypass indicator.
- starter valve manual
- reverser latches.


HINGE INTERFACE TO PYLON
CORE COWL OVERLAP INTERFACE
FAN FRAME INTERFACE
INTEGRAL SDOF SOUND TREATMENT WITH WIRE MESH
LINEAR SDOF SOUND TREATMENT WITH WIRE MESH
GRAPHITE/EPOXY AND NOMEX COMPOSITE TRANSCOWL
ALUMINUM CASCADE
LIGHTWEIGHT ACTUATION SYSTEM
FAN COWL INTERFACE
CF8 - 6787 - 00 - A

BM5 71 13 00 0 LPMO - 14 - 07
DM5

Thrust Reverser Cowl
Figure 006

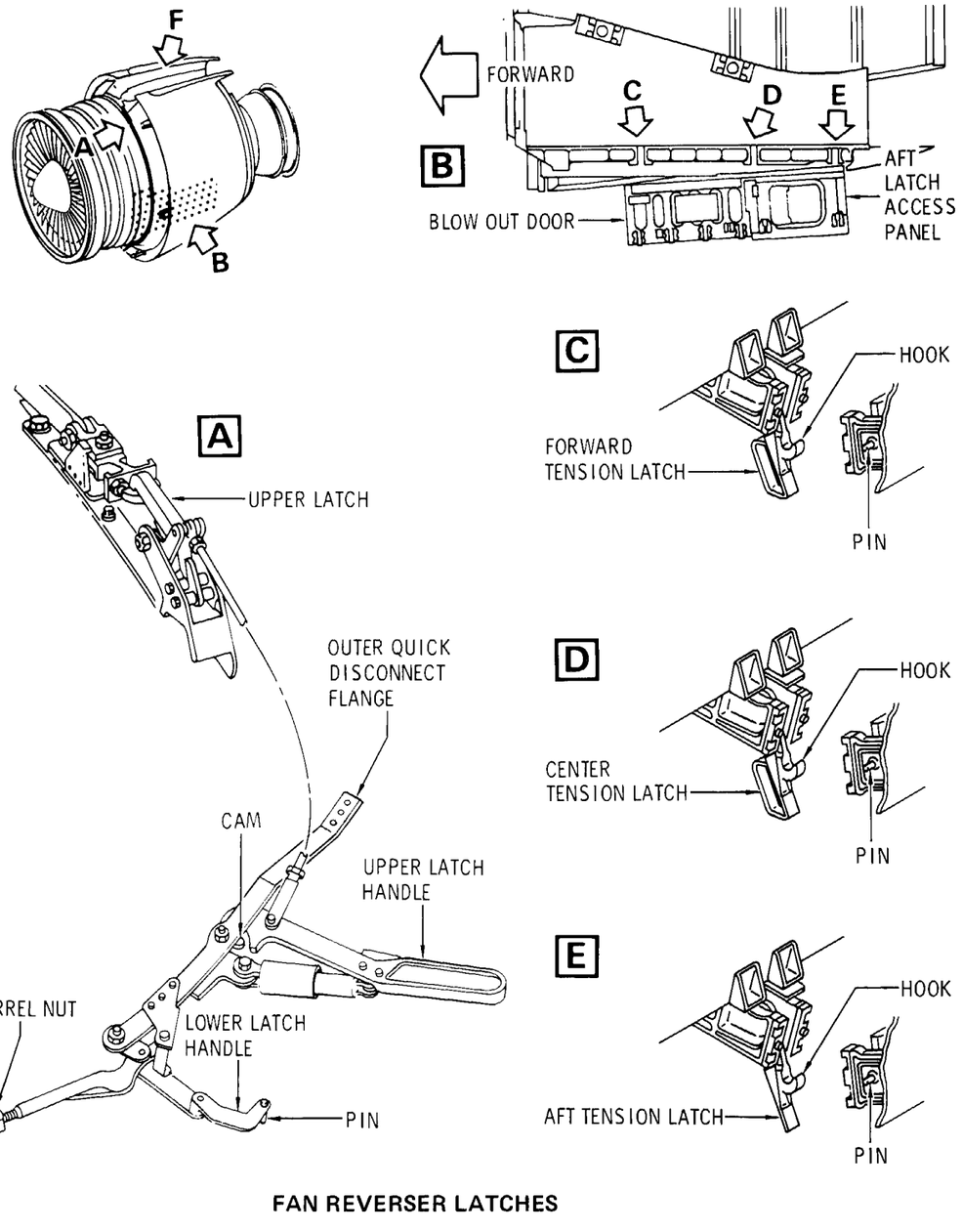


BM5 71 13 00 0 LRMO 14 09
DM5

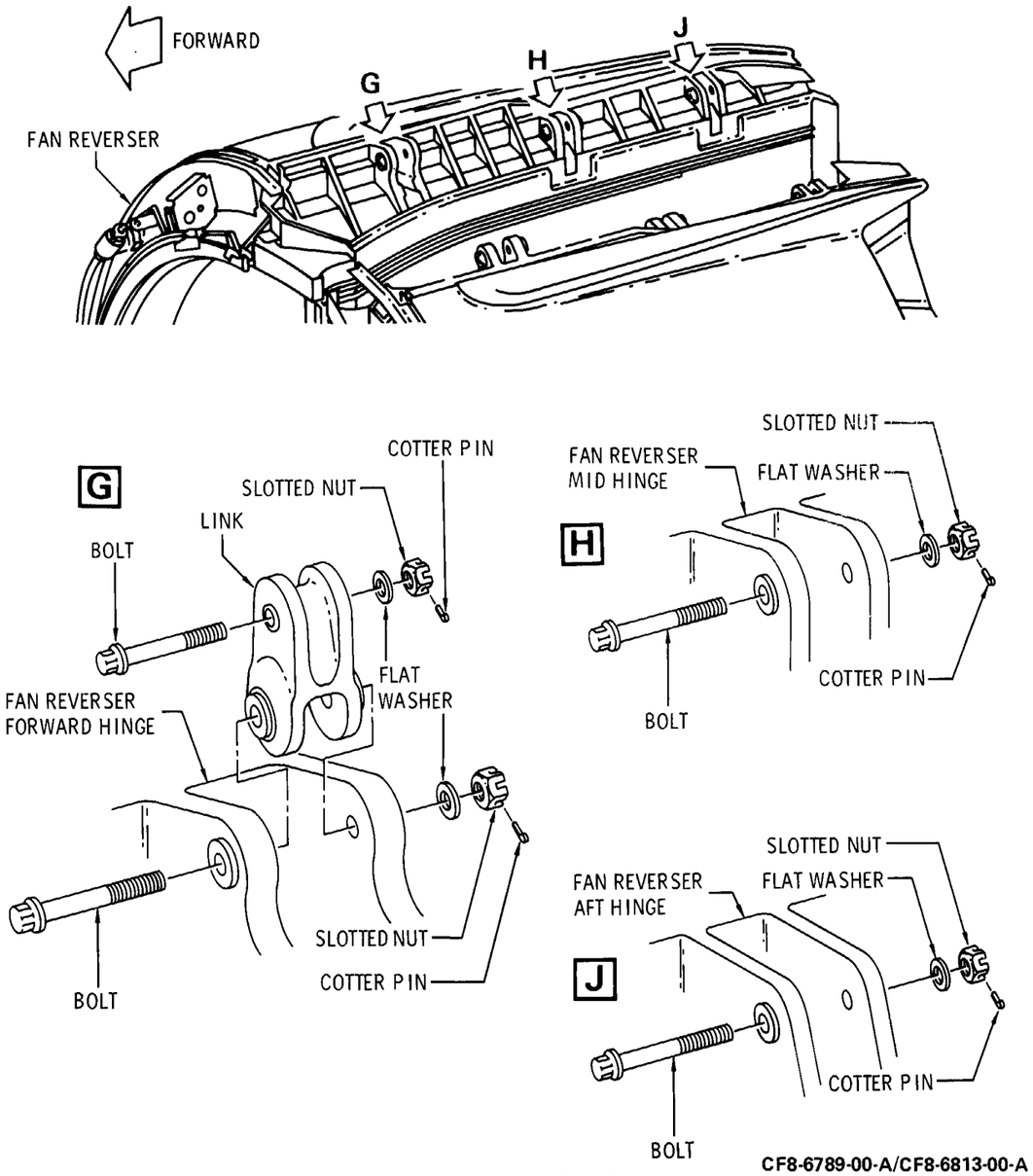
Thrust Reverser Forward Sound Panel Blocker Door
Composition and Acoustic Treatment
Figure 007

INTENTIONALLY BLANK

Printed in France



FAN REVERSER LATCHES

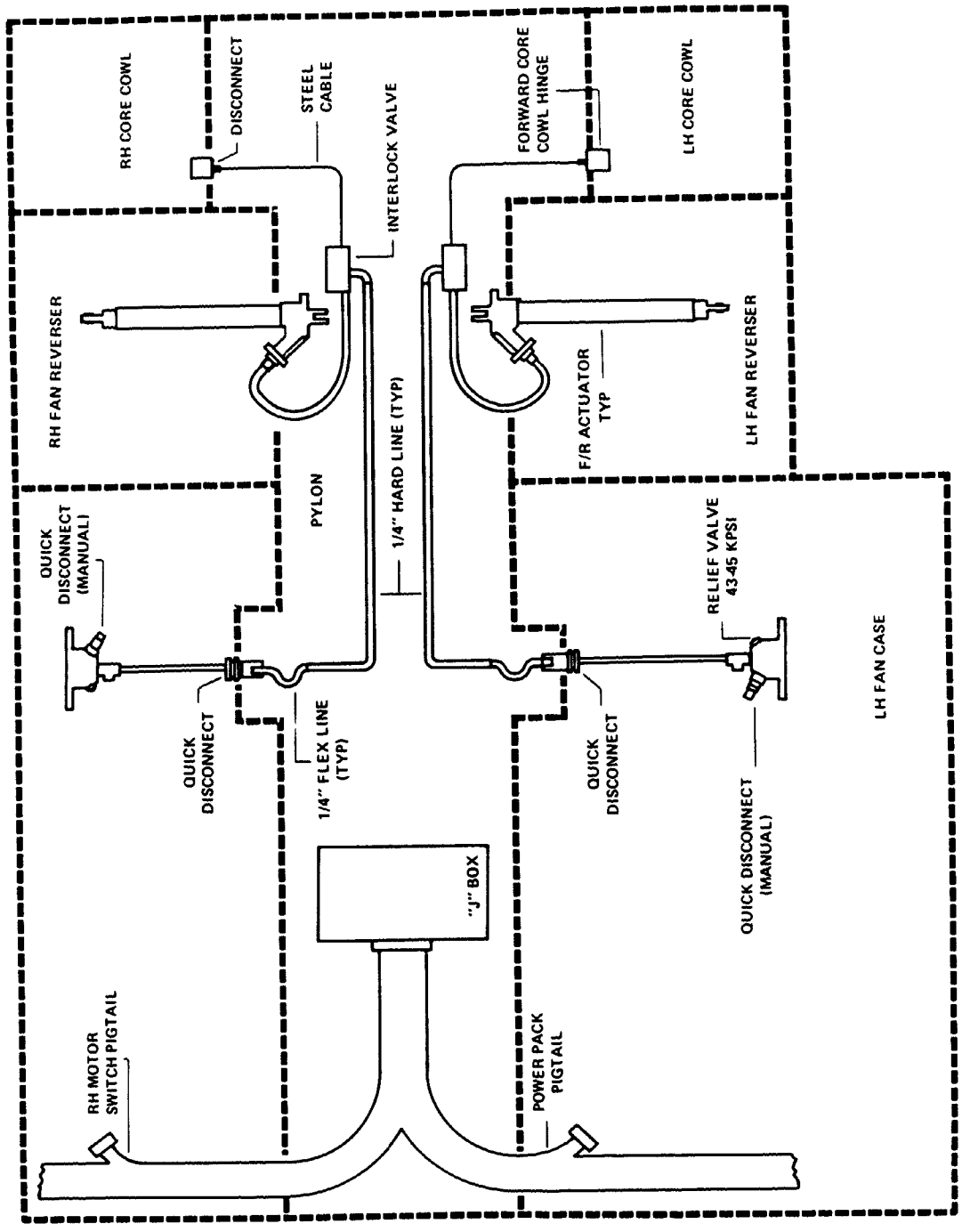


CF8-6789-00-A/CF8-6813-00-A

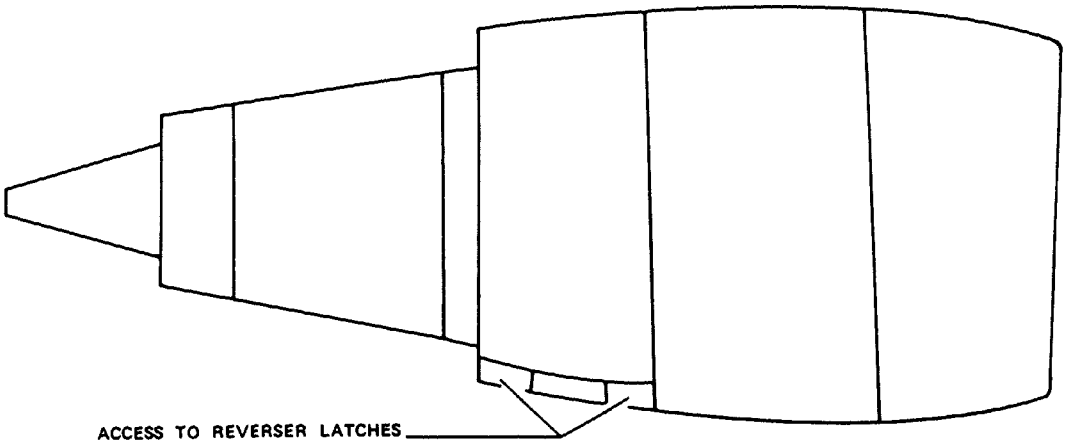
FAN REVERSER COWL HINGES

BM5 71 13 00 0 LWMO - 14 - 07
DM5

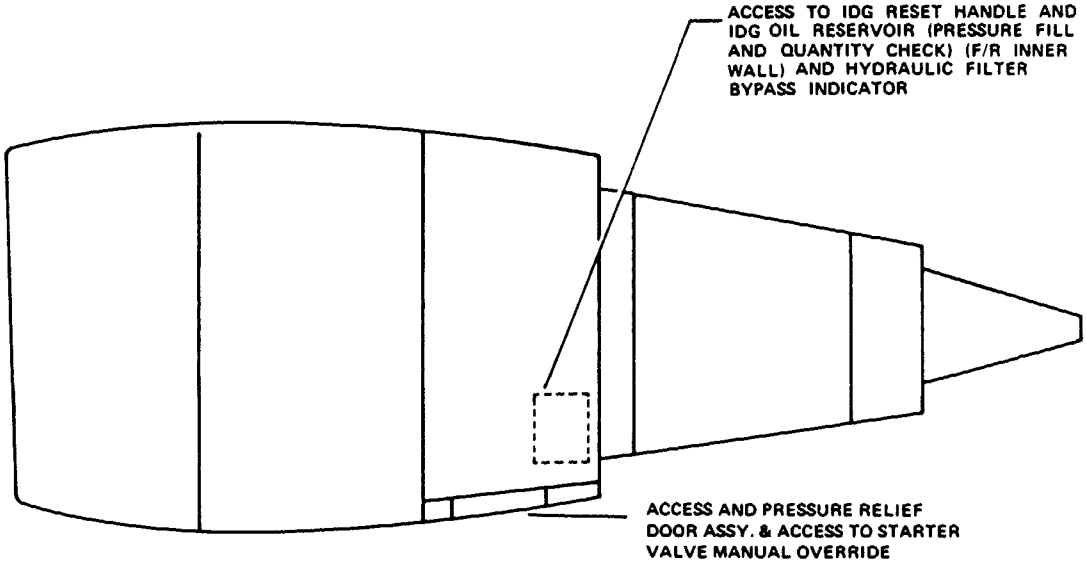
Fan Reverser Latches and Hinges
Figure 008



Fan Reverser Hydraulic Power Door Actuation System
with Core Cowl Interlock (Baseline)
Figure 009



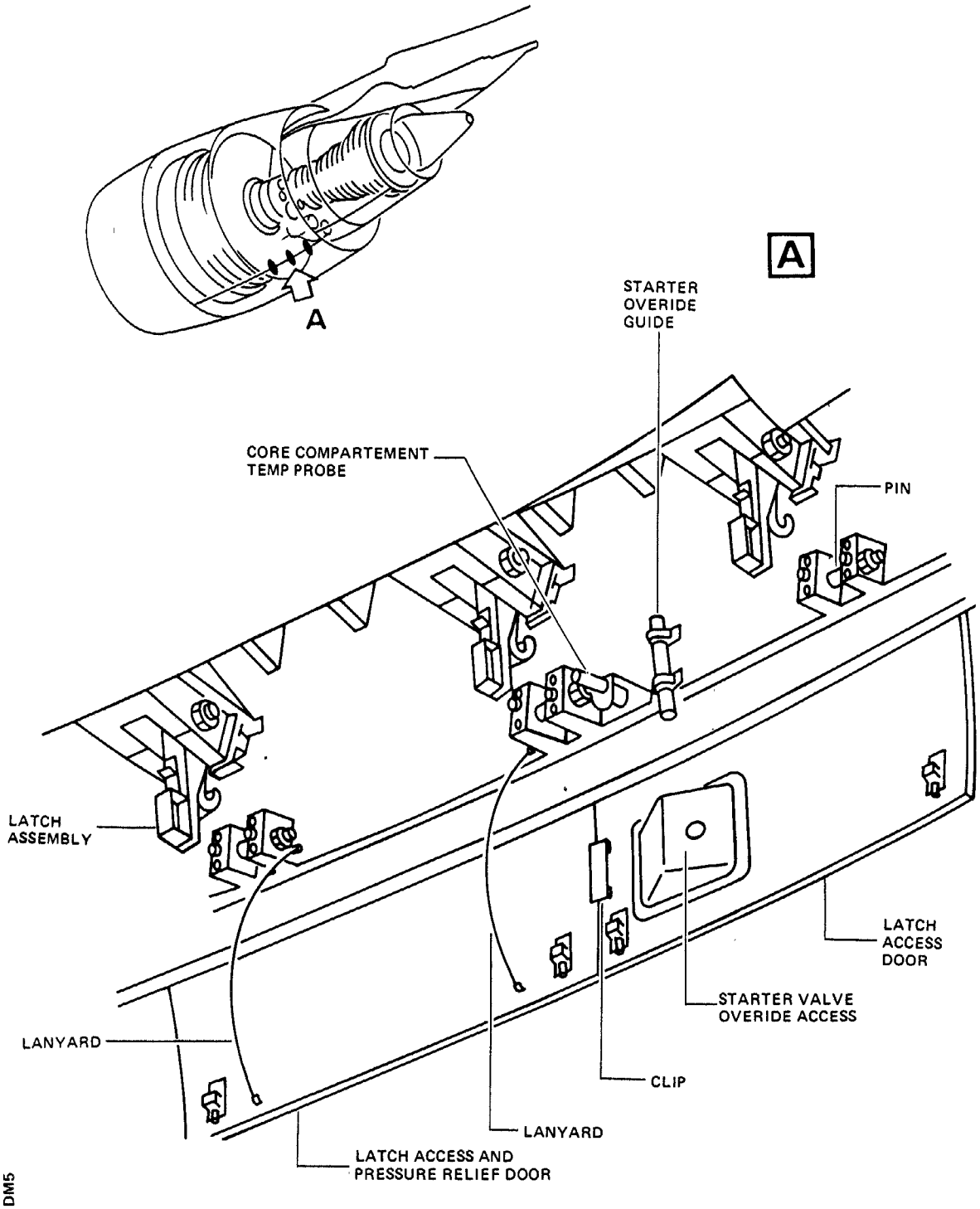
R. H. SIDE VIEW


ACCESS TO IDG RESET HANDLE AND IDG OIL RESERVOIR (PRESSURE FILL AND QUANTITY CHECK) (F/R INNER WALL) AND HYDRAULIC FILTER BYPASS INDICATOR
ACCESS AND PRESSURE RELIEF DOOR ASSY. & ACCESS TO STARTER VALVE MANUAL OVERRIDE

L. H. SIDE VIEW

BM5 71 13 00 0 LVMO 14 07
DM5

Fan Reverser Access Doors
Figure 010



Fan Reverser Latch Access Door and Core Compartment
Figure 011

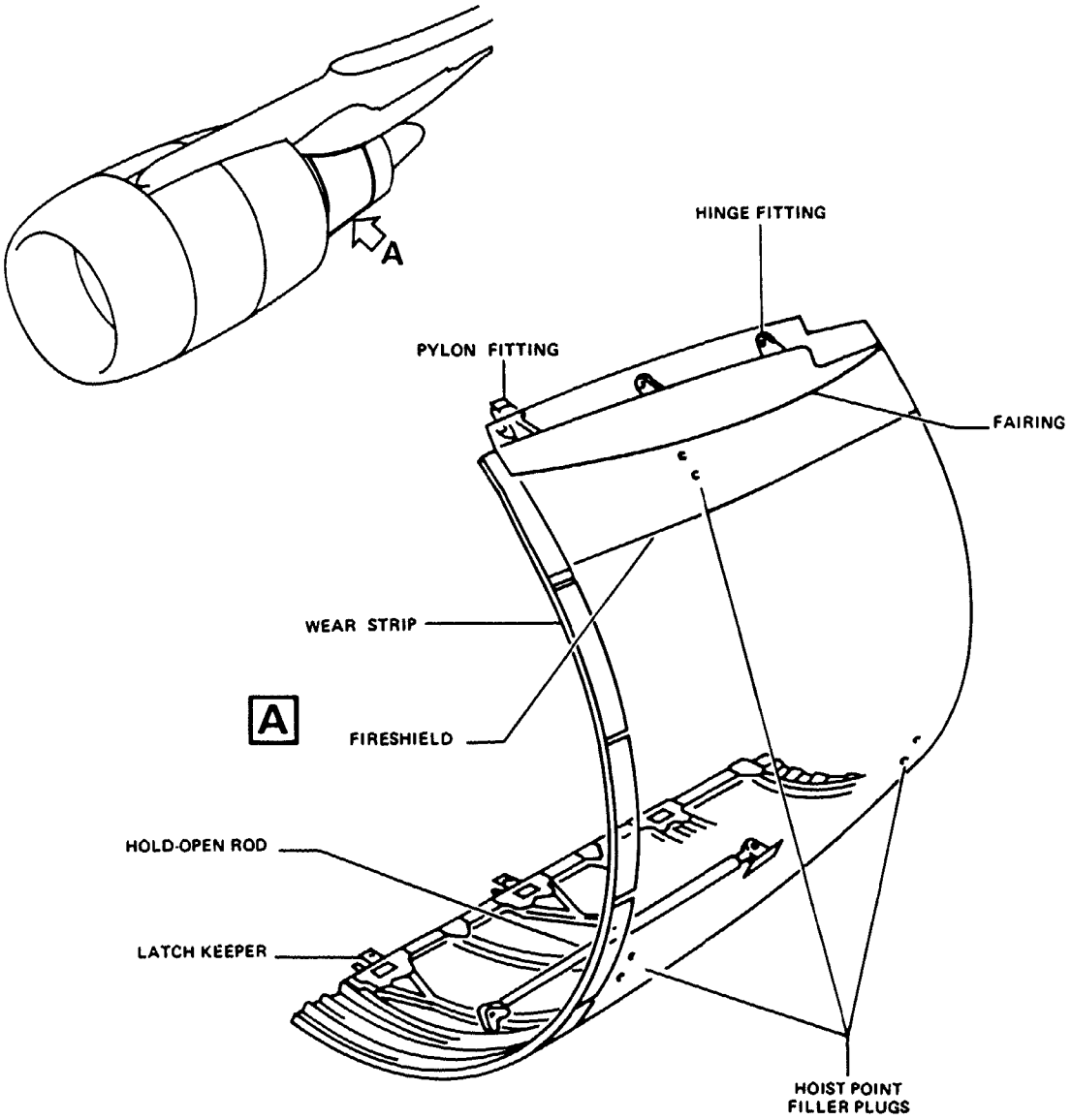
3. Core Cowl Doors
(Ref. Fig. 012, 013, 014)
(Ref. Fig. 015, 016, 017)

A General
The core cowl assemblies are interchangeable units and enclose the core engine between the fan reverser cowl and the exhaust nozzle. Each assemnbly is hinged from the pylon in three locations and latched along the bottom splitline with three tension hook latches.
The cowls are designed to be structurally adequate when any one of the latches is unlatched, except in nacelle over-pressurization condition due to a pneumatic duct failure.
Opening of the core cowl will provide access to the hardware mounted on the turbine section of the engine.

B. Description
The core cowls are a conventional sheet metal structure. A land is provided at the forward end for the fan reverser. At the aft end of the core cowl, a sliding land is provided with the exhaust nozzle to allow for engine expansion.
A sheet metal seal (stainless steel) is provided along the upper longitudinal splitline to prevent air leakage. In addition a fire shield (stainless steel) is located in the upper 45° segment of each cowl panel on the inner surface.
NOTE : The internal pressure loads and external air loads are reacted through the structure and transmitted into the pylon through the hinge fittings.

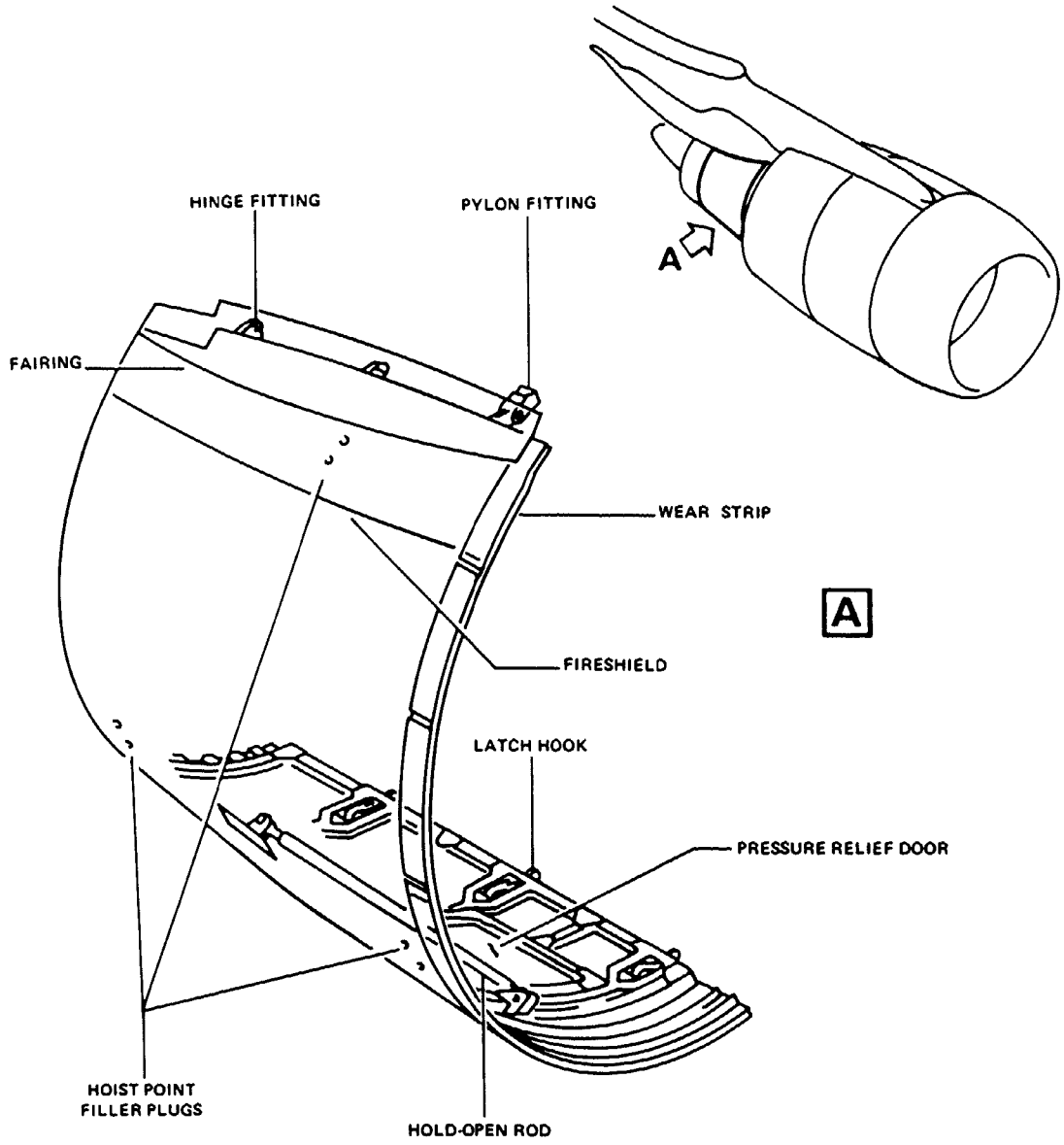
C. Opening/Closing
A hold open rod supports each panel in an open position and support fittings are provided on the cowl frames for ground support equipment hold open links.
The fan reverser cowl must be opened in order to open the core cowl.
The core cowl doors may be opened to a maximum of 52°. A hold open rod is provided to maintain each door at 50° open position.

D. Pressure Relief Door and Vent
A pressure relief door is located in the right hand cowl. Compartment cooling air is vented aft at the sliding land between the core cowl and primary nozzle in the lower 270° segment.

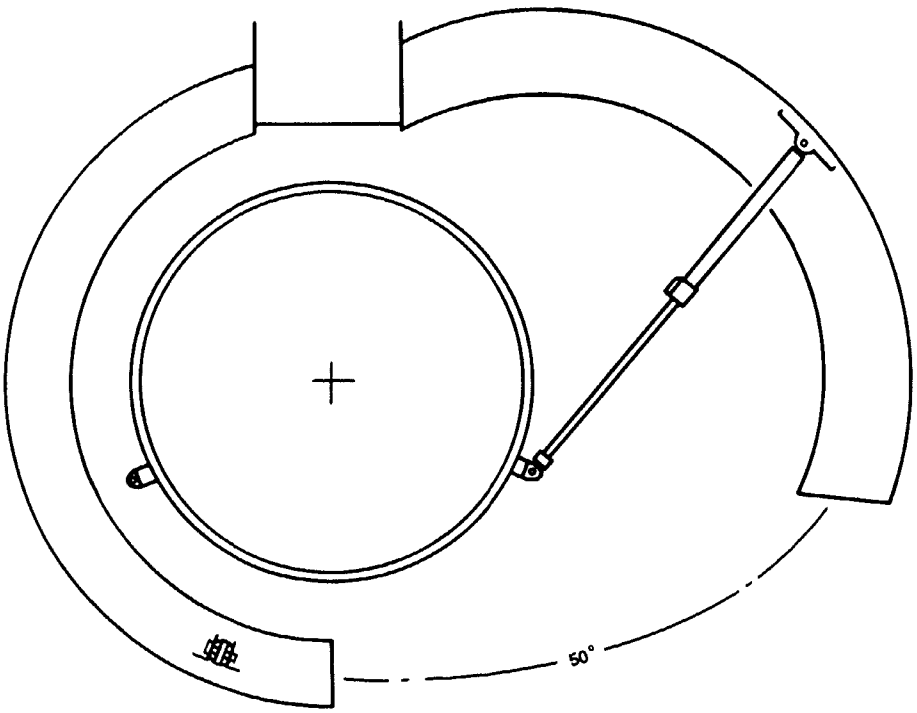


BM5 71 13 00 0 LXMO 14 07
DM5

Core Cowl Door
Figure 012

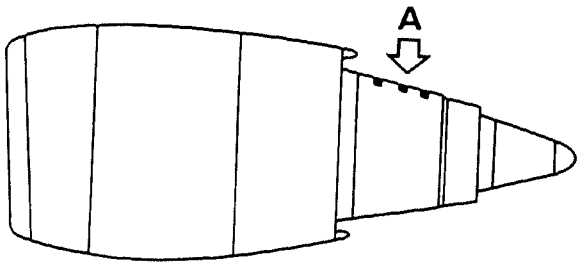


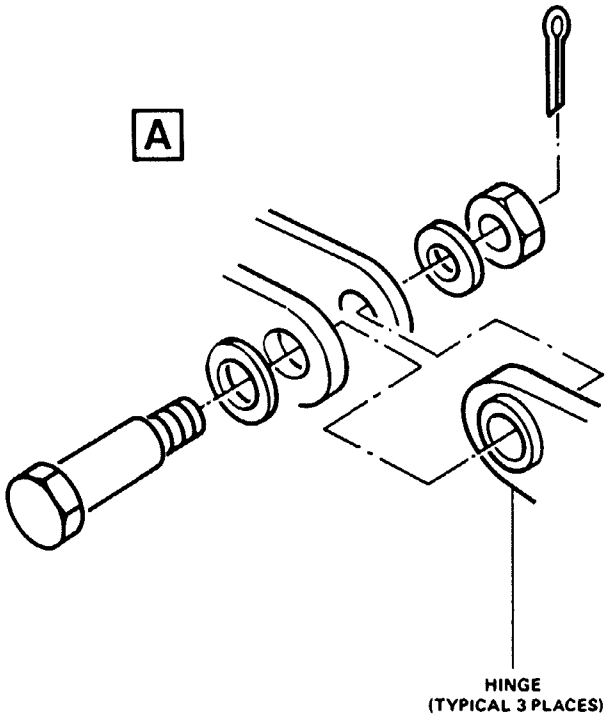
Core Cowl Door
Figure 013



BM5 71 13 00 0 LANO 14 07
DM5

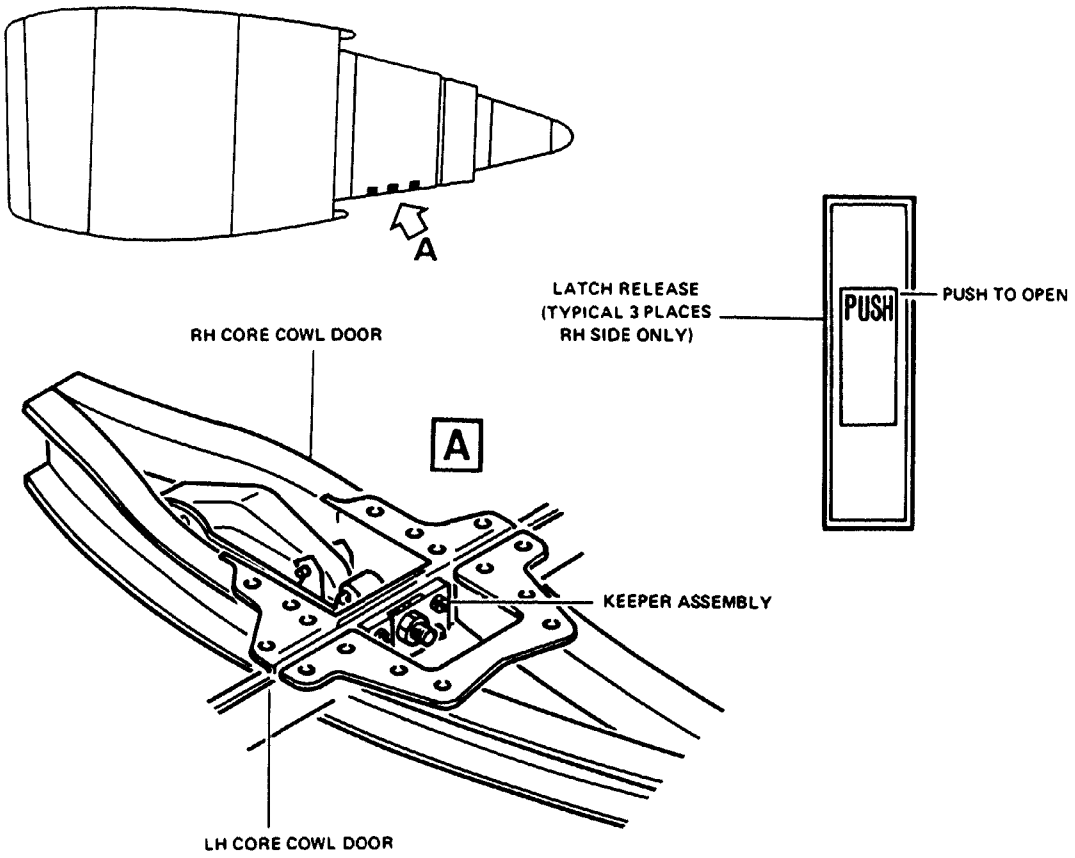
Core Cowl Door Opening
Figure 014





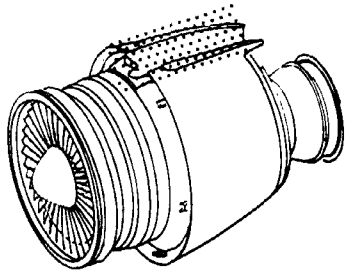
BM5 71 13 00 0 LCNO-14-07
DM5

Core Cowl Door Hinges
Figure 015



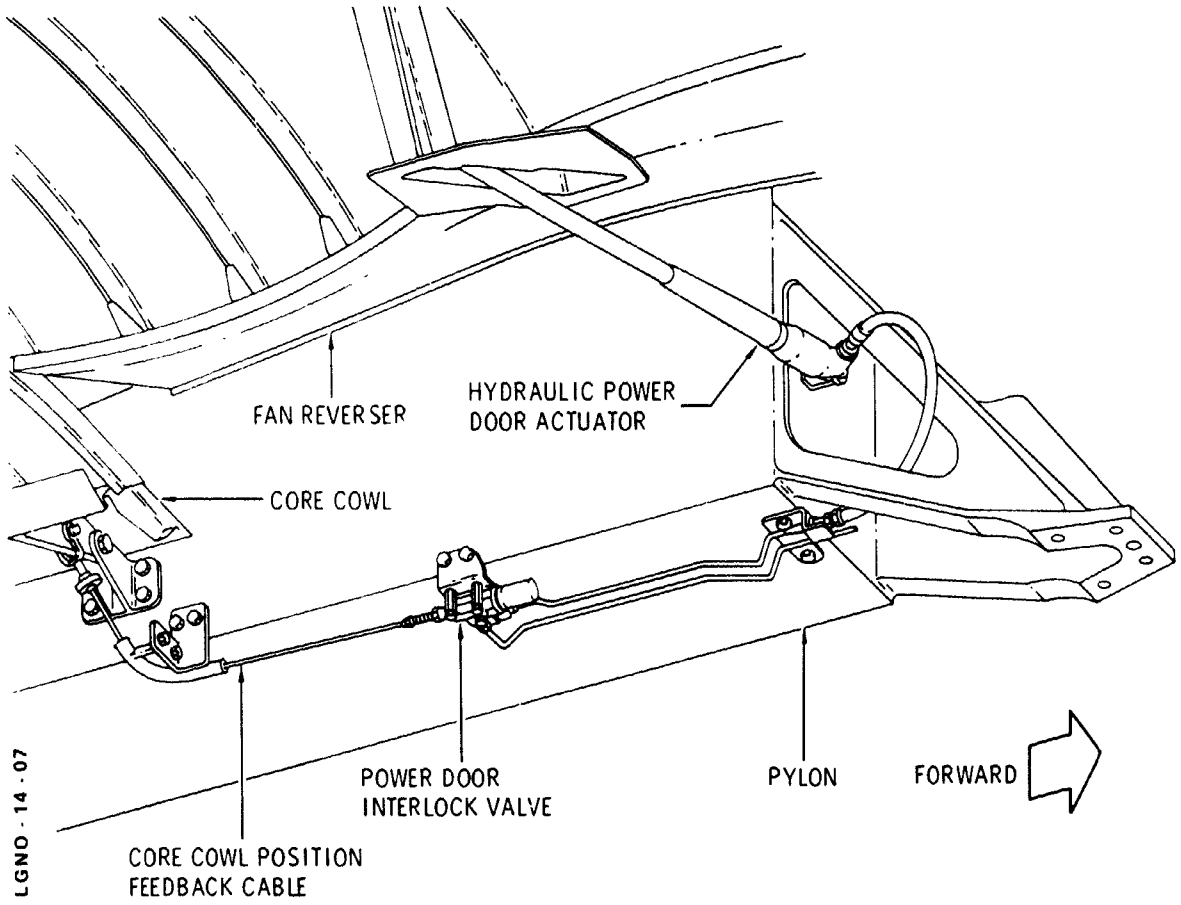
BM5 71 13 00 0 LENO 14 07
DM5

Core Cowl Door Latches
Figure 016



RH SIDE SHOWN WITH ENGINE REMOVED FROM PYLON

LH SIDE OPPOSITE



Core Cowl/Reverser Interlock System
Figure 017

COWL DOORS - SERVICING

1. General

R This procedure provides instructions for two different methods for
R opening and closing the thrust reverser cowl doors. The first method
R (see paragraph C.) uses the hydraulic system to open the thrust
R reverser cowl doors. The second method uses a sling (see paragraph D.).
R The second method should be used only if the hydraulic system does not
R work.
Opening and closing procedures are identical for left and right cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C6983	Pump, Hydraulic - Power Opener
B.	Circuit Breaker Safety Clips
R C. 97102A4241M000	Sling, Thrust Reverser Opening
R D.	Hoist, Crane
R Referenced Procedures	
- 78-31-00, P. Block 501	Thrust Reverser System Control
- 78-32-00, P. Block 601	Fan Reverser Assembly

**ON A/C 001-100,

3. Procedure

A. Job Set-Up
(1)Open safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	ENG1 & 2/START/CTL/WARN	1KG	335/R68
133VU	ENG1 & 2/IGNITION/SYS A	1JH	334/S72
133VU	ENG1 & 2/IGNITION/SYS B	2JH	333/T72
133VU	ENG1/REV/CTL	1KM	332/U69
133VU	ENG2/REV/CTL	2KM	331/V74
133VU	ENG1/THRUST REVERSER LOCK	45KM	332/U67
133VU	ENG2/THRUST REVERSER LOCK	44KM	331/V75

**ON A/C 001-100,

B. Fan Cowl Door Opening and Closing (Ref. Fig. 301)
(1)Open fan cowl doors as follows :
WARNING : GET SUFFICIENT AID FROM TWO OR MORE PERSONS OR SUFFICIENT EQUIPMENT TO LIFT OR LOWER THE FAN COWL DOORS. EACH FAN COWL

DOOR WEIGHS APPROXIMATELY 134 LBS. (61 KG). THE FAN COWL DOOR CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT IF IT FALLS OR THE WIND MOVES IT.

CAUTION : DO NOT OPEN THE FAN COWL DOORS IF THE GROUND WIND VELOCITIES ARE MORE THAN 40 KNOTS. DO NOT LEAVE THE DOORS OPEN IF THE GROUND WIND VELOCITIES ARE MORE THAN 60 KNOTS. WINDS GREATER THAN THESE VELOCITIES WILL BREAK OR CAUSE DAMAGE TO THE DOORS, OPENING DEVICES, HOLD-OPEN RODS, OR THEIR RELATED HARDWARE.

CAUTION : OPEN FAN COWL LATCHES BY HAND. DO NOT USE TOOLS TO OPEN FAN COWL LATCHES, DAMAGE CAN OCCUR TO THE LATCH AND/OR FAN COWL DOORS.

(a)Push trigger on fan cowl door latches to release latch handles.

(b)Pull latch handles until latch hooks release from clevises.

CAUTION : PRIMARY LOCK RED BAND AND WORD "UNLOCKED" MUST BE COVERED WHEN BALL LOCKS ARE POSITIVELY ENGAGED. SECONDARY LOCKS MUST BE ENGAGED IN SLOTS IN ROD.

CAUTION : MAKE CERTAIN THAT THE UPPER LATCH HANDLE IS FULLY OVER-CENTER BEFORE ATTEMPTING TO OPEN REVERSER HALF. FAILURE TO REACH TOTAL DISENGAGEMENT COULD RESULT IN HARDWARE DAMAGE.

(c)Open fan cowl door sufficiently to unstow hold-open rods and extend to full deployed and locked position. Both the primary and secondary locks must be in the locked position.

(2)Close fan cowl doors as follows :

CAUTION : CLOSE AND SECURE THE THREE FAN COWL LATCHES IN A SEQUENCE OF FRONT TO BACK OR BACK TO FRONT WHEN CLOSING THE FAN COWL DOORS. MAKE SURE THAT ALL THREE LATCHES ARE CLOSED AND SECURE PRIOR TO FLIGHT. FAILURE TO CLOSE ALL THREE LATCHES BEFORE FLIGHT MAY RESULT IN THE FAN COWL OPENING DURING FLIGHT.

(a)Disengage hold-open rods from engine detents and stow on door.

(b)Lower door to unlatched closed position.

(c)Push doors together and engage door latch hooks with their keepers.

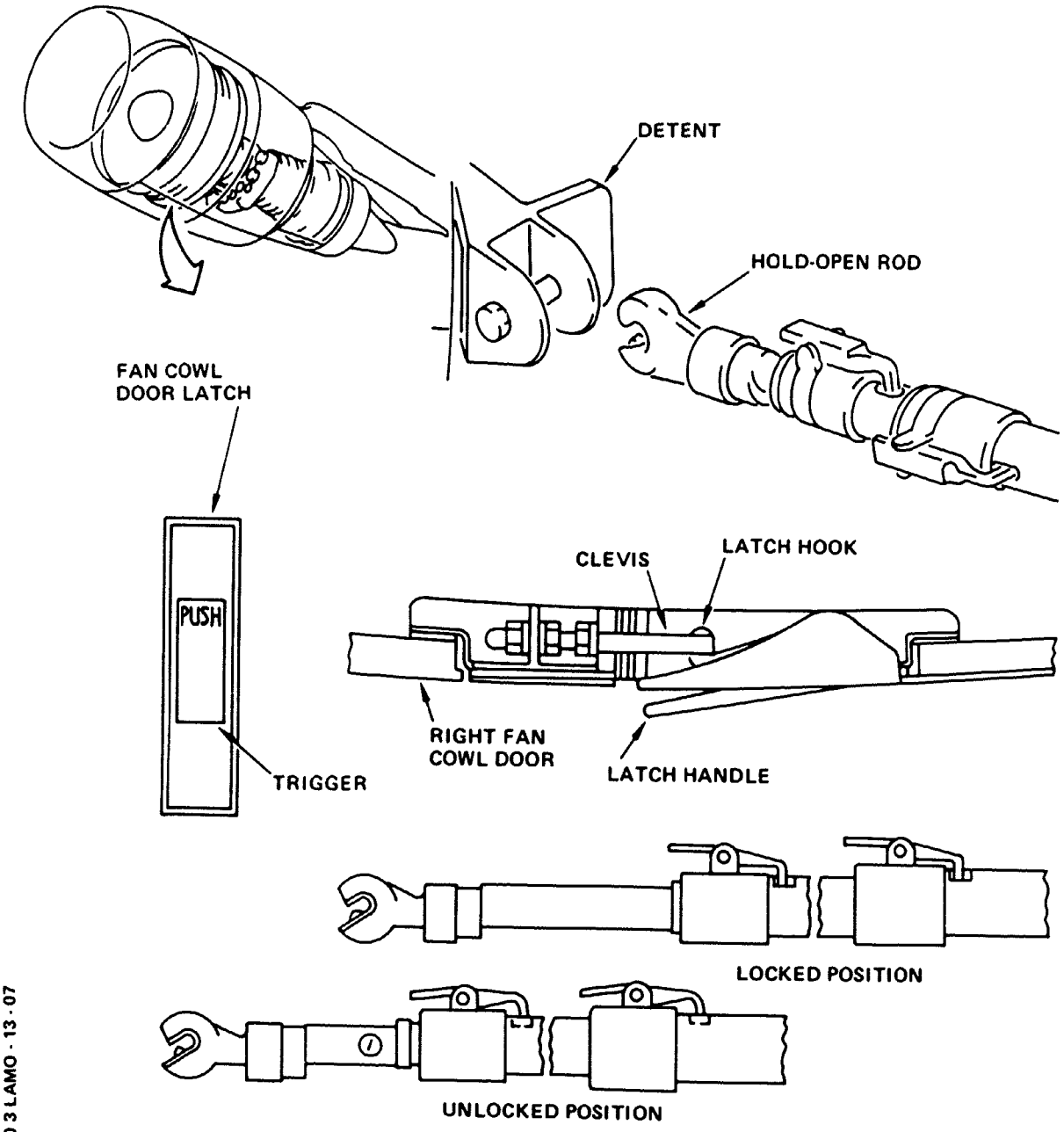
CAUTION : MAKE SURE THAT THE SPECIFIED FORCE IS NECESSARY TO PUSH THE LATCH HANDLES CLOSED AND TO OPERATE THE "OVERCENTER" LOCKING FUNCTION OF THE LATCHES. IF THE LATCHES ARE NOT CORRECTLY CLOSED, THE FAN COWL DOORS CAN OPEN IN FLIGHT.

CAUTION : MAKE SURE THAT THE LATCHES ARE FULLY OPEN BEFORE CLOSING. LATCHES THAT ARE PARTIALLY OPEN CAN INCORRECTLY ENGAGE WITH THE FRONT OF THE CLEVIS. IF THE LATCHES ARE NOT CORRECTLY CLOSED, THE FAN COWL DOORS CAN OPEN IN FLIGHT.
(Ref. Fig. 302)

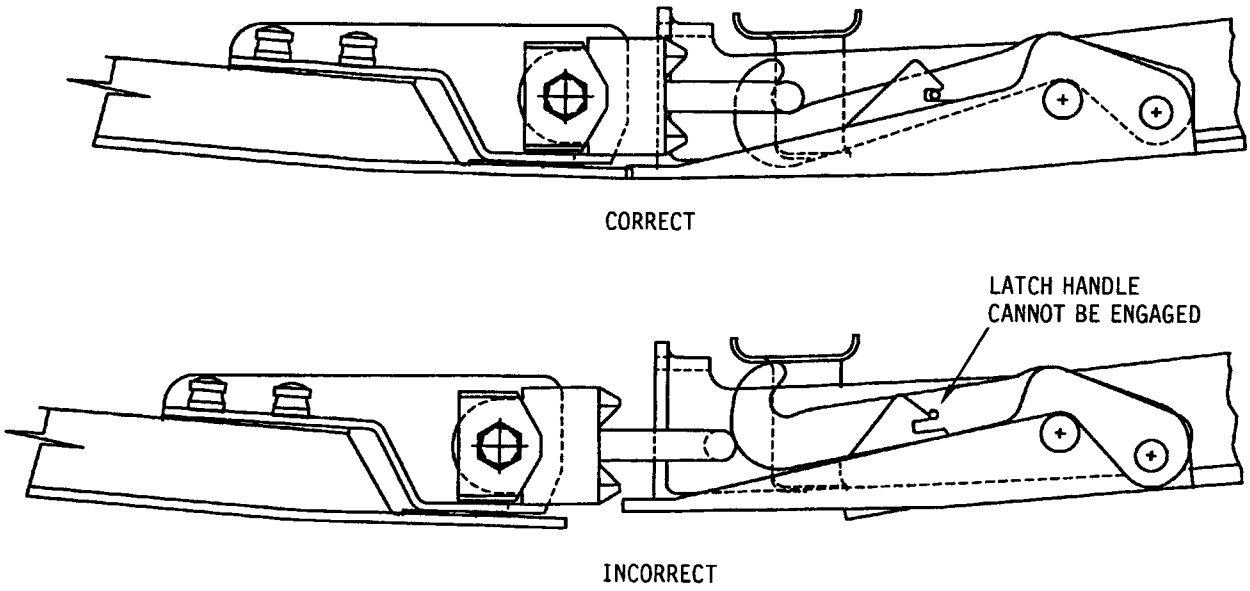
(d)Close latches by pressing up on latch handle until trigger drops in place to retain handle.

R C. Thrust Reverser Cowl Door Opening and Closing (Hydraulic Method)

WARNING : USE THE THRUST REVERSER COWL DOOR HYDRAULIC POWER OPENING SYSTEM ONLY FOR OPENING AND CLOSING THE REVERSER HALVES. THE SYSTEM SHOULD NEVER BE USED AS A HOLD OPEN DEVICE. ALWAYS SECURE EACH OPENED REVERSER HALF WITH AN APPROVED BRACE OR HOLD OPEN ROD, AS DIRECTED BY THE INSTRUCTIONS BELOW, TO PREVENT SERIOUS INJURY DUE TO ACCIDENTAL OR INADVERTENT CLOSURE. KEEP ALL PERSONNEL CLEAR OF



Fan Cowl Door Latch and Hold-Open Rod
Figure 301



C2M-138-00

BM5 71 13 00 3 LBM0 00

Incorrect Latch Position
Figure 302

AREAS UNDER AND BETWEEN REVERSER HALVES DURING OPENING AND CLOSING CYCLES.

(1)Opening of the thrust reverser cowl door (Ref. Fig. 303, 304)

(a)Open and secure the fan cowl doors.

(b)Open blowout and access door assemblies.

(c)Release the mounting ring latch assembly as follows :

1 Pull lower latch handle outward approximately 1.0 in (25.4 mm) until the latch pin reaches the bottom of the upper latch slot.

CAUTION : MAKE CERTAIN THE LATCH RING UPPER LATCH HANDLE IS IN FULLY OPEN POSITION BEFORE YOU OPEN THE THRUST REVERSER. IF UPPER LATCH HOOK IS NOT FULLY DISENGAGED FROM THE U-BOLT, DAMAGE TO EQUIPMENT COULD OCCUR WHEN YOU OPEN THE THRUST REVERSER.

2 Rotate upper latch handle outward.

3 Do a visual inspection to make certain that the upper latch hook is fully disengaged from the U-bolt.

4 Rotate lower latch handle outward.

(d)Release fan reverser lower latches.

(e)Remove dust cover quick disconnect connector fitting at the multiple connector located on the aft fan case (5 o'clock for left hand).

(f)Attach hose from hydraulic hand pump (2C6983) to quick disconnect connector.

CAUTION : INSTALL HOLD OPEN ROD BALL-LOCK WITH PLUNGER BUTTON UP.

(g)Prior to operating the hand pump, first "crack open" by hand the fan reverser halves from the fan case and each other to free the hydraulic opening system from the frictional effects of the seals.

CAUTION : DO NOT USE THE HOLD OPEN ROD AS A HANDLE TO OPEN OR CLOSE THE THRUST REVERSER DOOR. IF YOU USE THE HOLD OPEN ROD AS A HANDLE, IT CAN CAUSE DAMAGE TO THE EQUIPMENT.

(h)Close pump valve and actuate pump until reverser half is raised sufficiently to install fan reverser hold open rod to fan case brace.

(i)Install fan reverser hold open rod to fan case brace.

(j)Release hydraulic pressure by slowly opening hydraulic pump valve.

(k)Disconnect pump hose from quick disconnect connector and install dust cover.

NOTE : An interlock valve has been incorporated in the cowl door system. The purpose of this valve is to prevent the closing of the reverser cowl while the core cowl is open.

(2)Closing of the thrust reverser cowl doors (Ref. Fig. 303, 304)

(a)Close core cowl doors.

WARNING : DO NOT REMOVE FAN REVERSER TO FAN CASE BRACE PRIOR TO STEP (d).

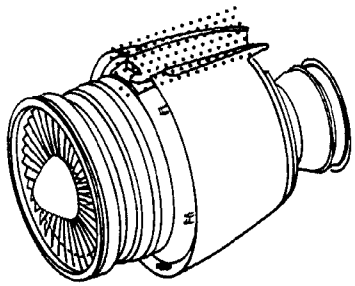
CAUTION : ENSURE THAT UPPER LATCH HANDLE IS IN THE FULLY OPEN POSITION WHEN CLOSING THRUST REVERSER OR DAMAGE TO THE U-BOLT SPRING RETAINER MOUNTED ON THE UPPER PORTION OF THE FAN CASE MAY RESULT.

(b)Remove dust cover from quick disconnect connector and install hydraulic pump hose.

(c)Close pump valve and actuate pump until fan reverser to fan case brace becomes unloaded.

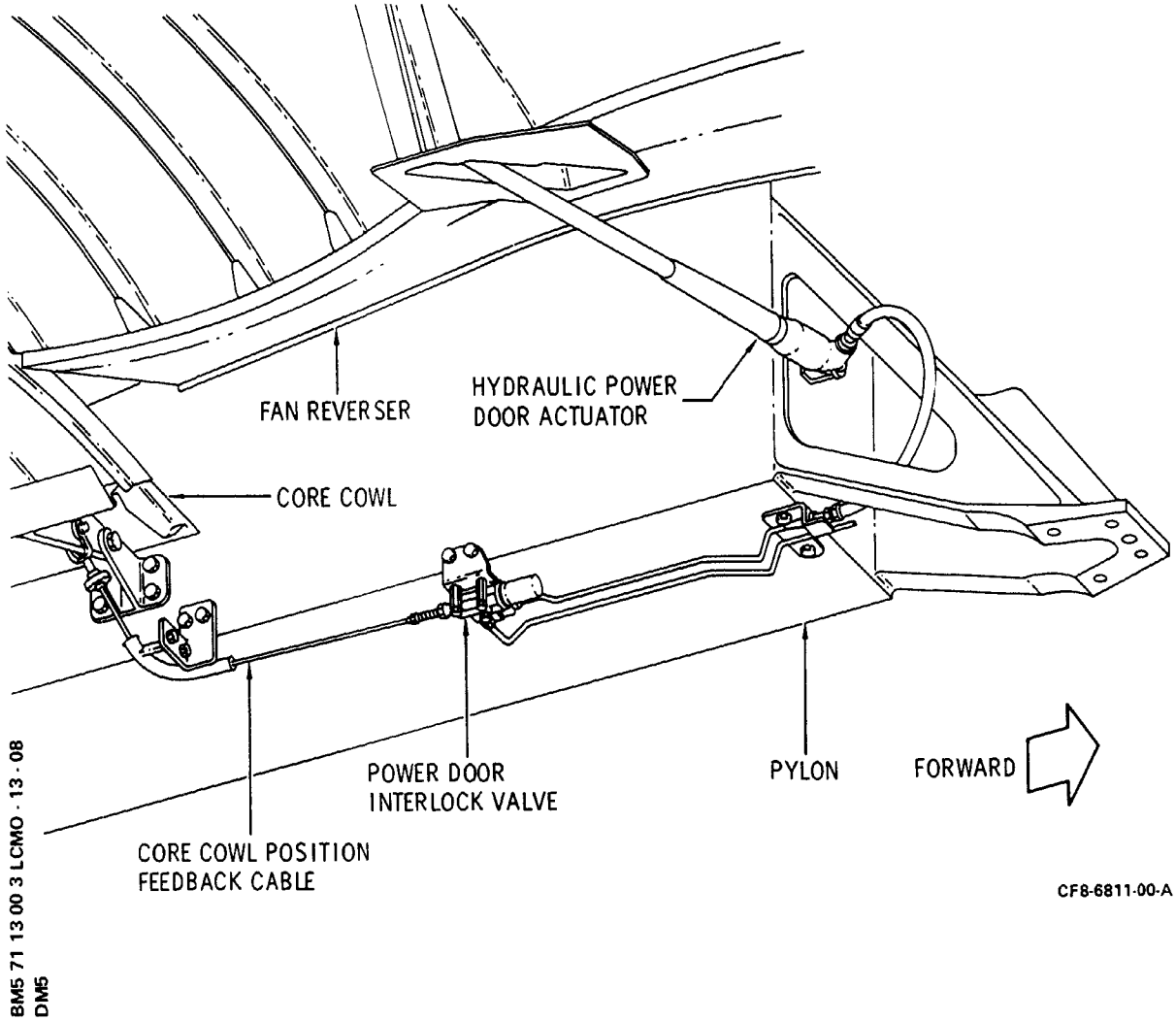
(d)Remove the fan reverser hold open rod from fan case brace.

CAUTION : DO NOT USE THE HOLD OPEN ROD AS A HANDLE TO OPEN OR CLOSE THE



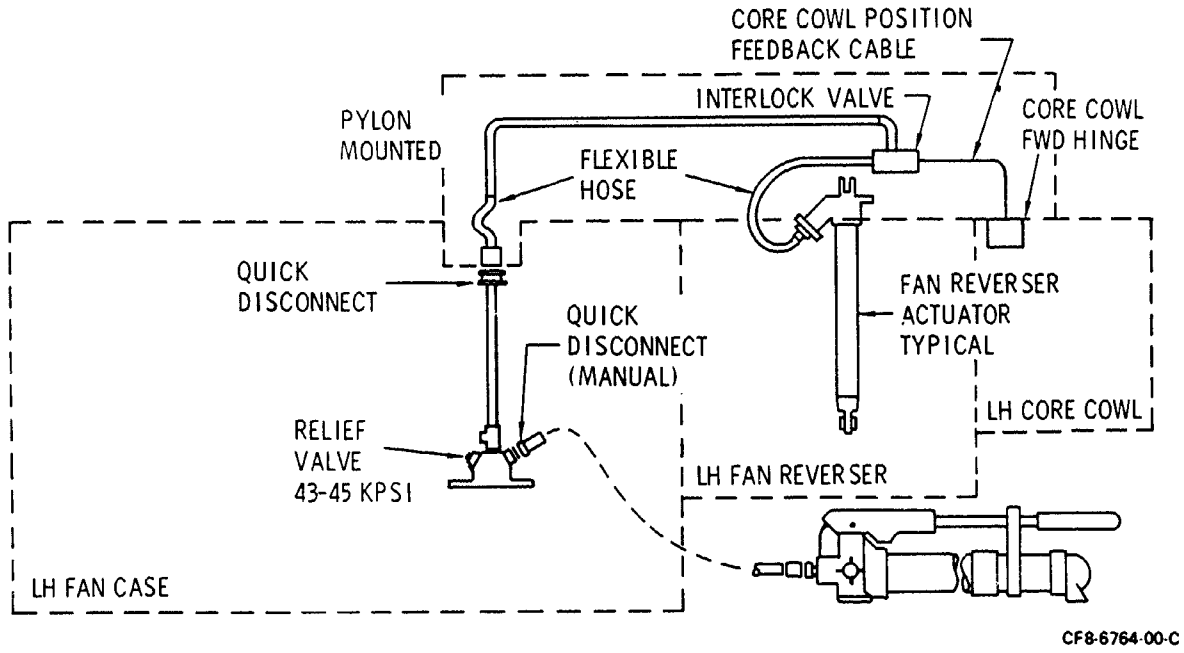
RH SIDE SHOWN WITH ENGINE REMOVED FROM PYLON

LH SIDE OPPOSITE



BM5 71 13 00 3 LCMO - 13 - 08
DM5

Thrust Reverser Cowl Door Opening System
Figure 303



BMS 71 13 00 3 LGMO - 13 - 08
DM5

Thrust Reverser Cowl Door Opening System - Schematic
Figure 304

THRUST REVERSER DOOR. IF YOU USE THE HOLD OPEN ROD AS A HANDLE, IT CAN CAUSE DAMAGE TO THE EQUIPMENT.

(e)Before you close the thrust reverser half, do the checks that follow :

1 Examine the latch ring mechanism for binding or interference (Ref. 78-32-00, P. Block 601).

2 Examine the latch ring for grease or unwanted material at the latch ring/V-groove interface (Ref. 78-32-00, P. Block 601).

(f)Slowly open the pump valve and allow the cowl door to lower.

NOTE : With the valve full open, the cowl door should operate in a smooth closing direction and close in approximately 15 seconds from a full open position.

(g)Secure the three main latches and the latch ring to complete the cowl door closing.

CAUTION : WHEN YOU SECURE THE FAN REVERSER, MAKE CERTAIN THAT THE LATCH RING UPPER LATCH HOOK HAS ENGAGED THE U-BOLT. IF THE LATCH HOOK IS NOT FULLY ENGAGED WITH THE U-BOLT, DAMAGE CAN OCCUR.

(h)Do a visual inspection to make certain that the upper latch hook is fully engaged with the U-bolt.

(i)Disconnect pump hose from quick disconnect connector and replace dust covers.

(j)Close access panel doors and then the blowout door.

Make sure that no preload exists on the blowout door when latched.

(3)Deactivation of Cowl Door Opening System.

(a)Should the cowl door opening system become inoperative during an opening/closing procedure, proceed as follows :

1 With a minimum of two technicians, apply 100 to 200 lbf. (448 to 889 N) to lower edge of fan reverser half ; manually pull reverser half upward.

WARNING : DO NOT STAND BETWEEN REVERSER HALVES DURING OPENING OR CLOSING. SEVERE INJURY COULD RESULT IN ANY SUDDEN CLOSURE.

2 Continue to pull reverser half upward to approximately 4 to 5 ft. (1.219 to 1.524 m) in order to gain access to hold-open rod attach point.

3 Install hold-open rod.

4 Open pump valve and allow oil to return to the pump reservoir.

5 Disconnect pump hose from quick disconnect connector and replace dust covers.

(b)Repair or replace malfunctioning component.

After replacement or repair, operate system (Ref. 78-31-00, P. Block 501).

R D. Thrust Reverser Cowl Door Opening and Closing (Sling Method)

R (1)Opening of the thrust reverser cowl door (Ref. Fig. 303, 304, 305)

R (a)Open and secure the fan cowl doors.

R (b)Open the blowout and access door assemblies.

R (c)Release the mounting ring latch assembly as follows :

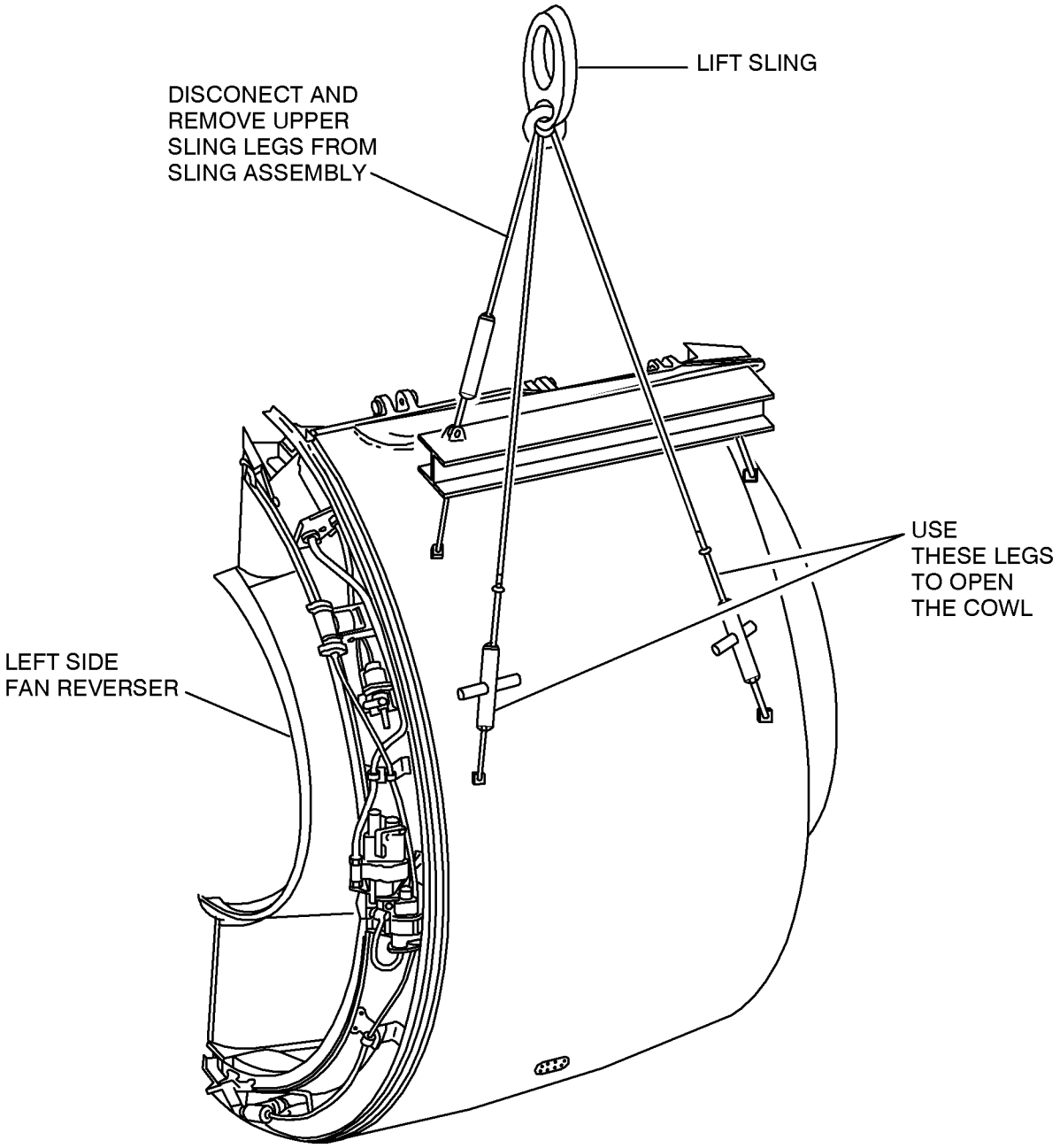
R 1 Pull the lower latch handle outward approximately 1.0 in. (25.4 mm) until the latch pin reaches the bottom of the upper latch slot.

R CAUTION : MAKE CERTAIN THE LATCH RING UPPER LATCH HANDLE IS IN FULLY OPEN POSITION BEFORE YOU OPEN THE THRUST REVERSER. IF

R UPPER LATCH HOOK IS NOT FULLY DISENGAGED FROM THE U-BOLT,
R DAMAGE TO EQUIPMENT COULD OCCUR WHEN YOU OPEN THE THRUST
R REVERSER.
R 2 Rotate the upper latch handle outward.
R 3 Do a visual inspection to make certain that the upper latch hook is
R fully disengaged from the U-bolt.
R 4 Rotate the lower latch handle outward.
R (d)Release fan reverser lower latches.
R (e)Do the steps that follow to prepare the thrust reverser sling
R (97102A4241M000) for installation :
R 1 Find the upper sling legs on the thrust reverser sling
R (Ref. Fig. 305).
R 2 Remove the upper sling legs from the lift sling. The upper sling
R legs are not used in this procedure.
R (f)Find the lowest two hoist points on the external surface of the
R thrust reverser translating cowl. The hoist points are identified by
R the stencil "HOIST POINT" and are located just above the thrust
R reverser forward-aft center line.
R (g)Attach the lower sling legs to the hoist points found in the previous
R step.
R (h)Attach the hoist to the thrust reverser sling.
R (i)Tighten the hoist to remove the looseness in the thrust reverser sling.
R (j)Use the hoist to slowly open the thrust reverser half. Open the thrust
R reverser half only enough to allow installation of the fan reverser
R hold open rod to the fan case brace.
R CAUTION : INSTALL HOLD OPEN ROD BALL-LOCK WITH PLUNGER BUTTON UP.
R CAUTION : DO NOT USE THE HOLD OPEN ROD AS A HANDLE TO OPEN OR CLOSE
R THE THRUST REVERSER DOOR. IF YOU USE THE HOLD OPEN ROD AS A
R HANDLE, IT CAN CAUSE DAMAGE TO THE EQUIPMENT.
R (k)Install the fan reverser hold open rod to the fan case brace.
R (l)Lower the hoist enough to remove the tension on the sling assembly.
R (2)Closing of the thrust reverser cowl doors (Ref. Fig. 303, 304, 305)
R (a)If necessary, close the core cowl doors.
R CAUTION : ENSURE THAT UPPER LATCH HANDLE IS IN THE FULLY OPEN
R POSITION WHEN CLOSING THRUST REVERSER OR DAMAGE TO THE
R U-BOLT SPRING RETAINER MOUNTED ON THE UPPER PORTION
R OF THE FAN CASE MAY RESULT.
R (b)Use the hoist to remove the slack from the sling and raise the sling
R far enough to remove the fan reverser hold open rod.
R (c)Remove the fan reverser hold open rod from the fan case brace.
R CAUTION : DO NOT USE THE HOLD OPEN ROD AS A HANDLE TO OPEN OR CLOSE
R THE THRUST REVERSER DOOR. IF YOU USE THE HOLD OPEN ROD AS A
R HANDLE, IT CAN CAUSE DAMAGE TO THE EQUIPMENT.
R (d)Before you close the thrust reverser half, do the checks that follow :
R 1 Examine the latch ring mechanism for binding or interference
R (Ref. 78-32-00, P. Block 601).
R 2 Examine the latch ring for grease or unwanted material at the latch
R ring/V-groove interface (Ref. 78-32-00, P. Block 601).
R (e)Slowly lower the hoist and cowl door until the sling hangs without
R tension.
R (f)Remove the sling from the hoist.

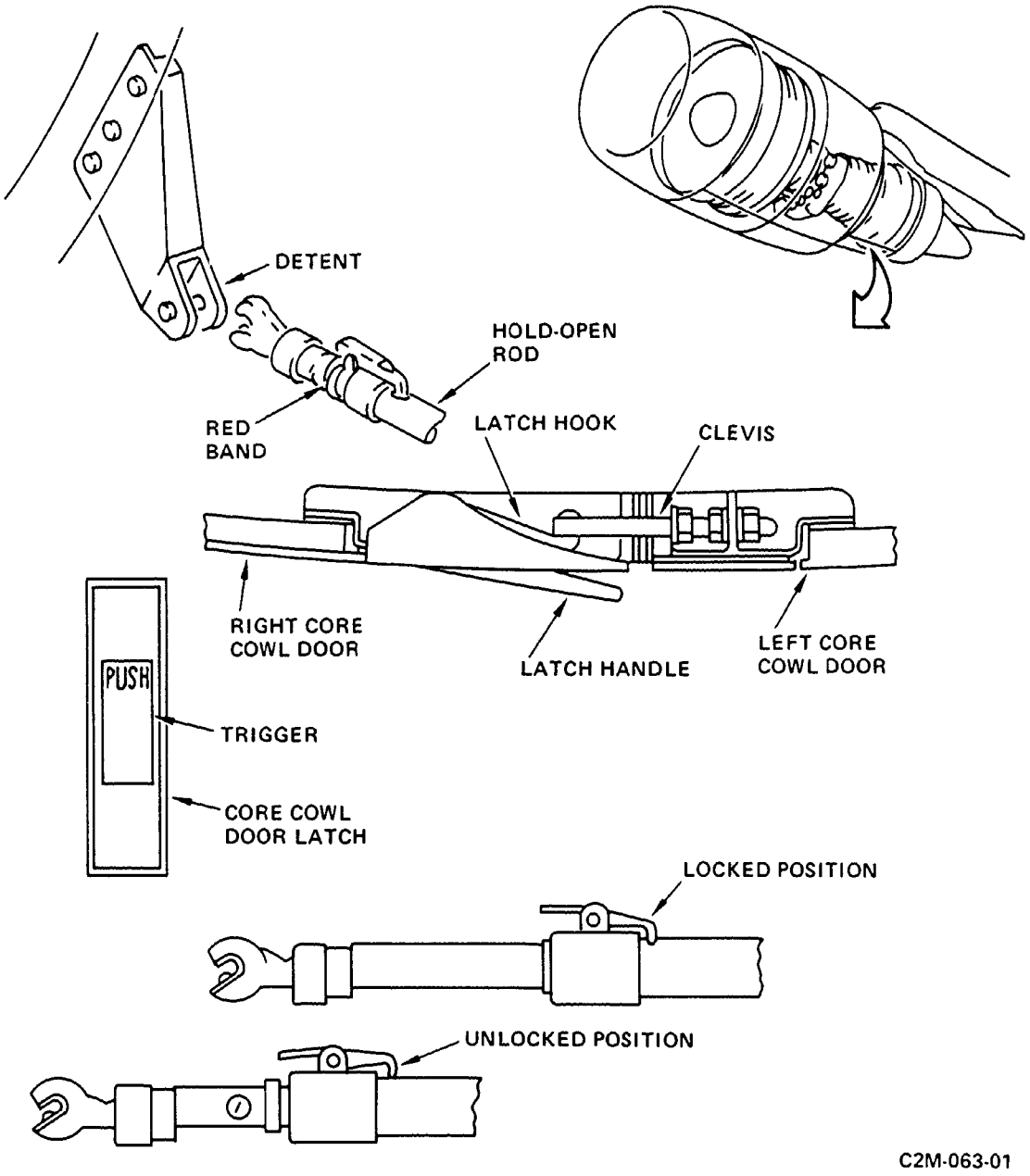
R (g)Remove the thrust reverser sling from the reverser.
R (h)Secure the three main latches and the latch ring to complete the cowl door closing.
R CAUTION : WHEN YOU SECURE THE FAN REVERSER, MAKE CERTAIN THAT THE LATCH RING UPPER LATCH HOOK HAS ENGAGED THE U-BOLT. IF THE LATCH HOOK IS NOT FULLY ENGAGED WITH THE U-BOLT, DAMAGE CAN OCCUR.
R (i)Do a visual inspection to make certain that the upper latch hook is fully engaged with the U-bolt.
R (j)Close the access panel doors and then blowout door. Make sure that no preload exists on the blowout door when latched.
R (k)Install the upper sling legs removed in step D.(1)(e)1 on the thrust reverser sling (Ref. Fig. 305).

R E. Core Cowl Door Opening and Closing (Ref. Fig. 306)
(1)Opening of Core Cowl Doors.
WARNING : GET SUFFICIENT AID FROM TWO OR MORE PERSONS OR SUFFICIENT EQUIPMENT TO LIFT OR LOWER THE CORE COWL DOORS. EACH CORE COWL DOOR WEIGHS APPROXIMATELY 62 LBS. (28 KG). THE CORE COWL DOOR CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT IF IT FALLS OR THE WIND MOVES IT.
CAUTION : DO NOT OPEN THE CORE COWL DOORS IF THE GROUND WIND VELOCITIES ARE MORE THAN 40 KNOTS. DO NOT LEAVE THE DOORS OPEN IF THE GROUND WIND VELOCITIES ARE MORE THAN 60 KNOTS. WINDS GREATER THAN THESE VELOCITIES CAN BREAK OR CAUSE DAMAGE TO THE DOORS, OPENING DEVICES, HOLD-OPEN RODS, OR THEIR RELATED HARDWARE.
(a)Open fan cowl doors.
(b)Open thrust reverser cowl doors.
(c)Push trigger on core cowl door latch to release latch handle.
(d)Pull latch handle until latch hook releases from clevis.
(e)Repeat steps (c) and (d) for other two core cowl door latches.
CAUTION : PRIMARY LOCK RED BAND AND WORD "UNLOCKED" MUST BE COVERED WHEN BALL LOCKS ARE POSITIVELY ENGAGED. SECONDARY LOCK MUST BE ENGAGED IN SLOT IN ROD.
(f)Open core cowl door sufficiently to unstow hold-open rod and extend to full deployed and locked position. Both the primary and secondary locks must be in the locked position.
(2)Closing of Core Cowl Doors.
(a)Disengage core cowl door hold-open rod and stow on core cowl door.
(b)Lower door to unlatched closed position.
CAUTION : MAKE SURE THAT THE LATCHES ARE FULLY OPEN BEFORE CLOSING. LATCHES THAT ARE PARTIALLY OPEN CAN INCORRECTLY ENGAGE WITH THE FRONT OF THE CLEVIS. IF THE LATCHES ARE NOT CORRECTLY CLOSED, THE FAN COWL DOORS CAN OPEN IN FLIGHT. (Ref. Fig. 302)
(c)Push doors together until all three core cowl door latch hooks engage their respective keepers.
(d)Close each latch by pressing up on latch handle until trigger drops in place to retain handle.
(e)Close thrust reverser doors.
(f)Close fan cowl doors.



Open/Close the Thrust Reverser Cowl Doors with a Sling
Figure 305

R



BM5 71 13 00 3 LEMO - 13 - 08
DM5

Core Cowl Door Latch and Hold-Open Rod
Figure 306

R F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags and close the appropriate circuit breakers.

CORE COWL - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the core cowl doors.

2. Equipment and Materials

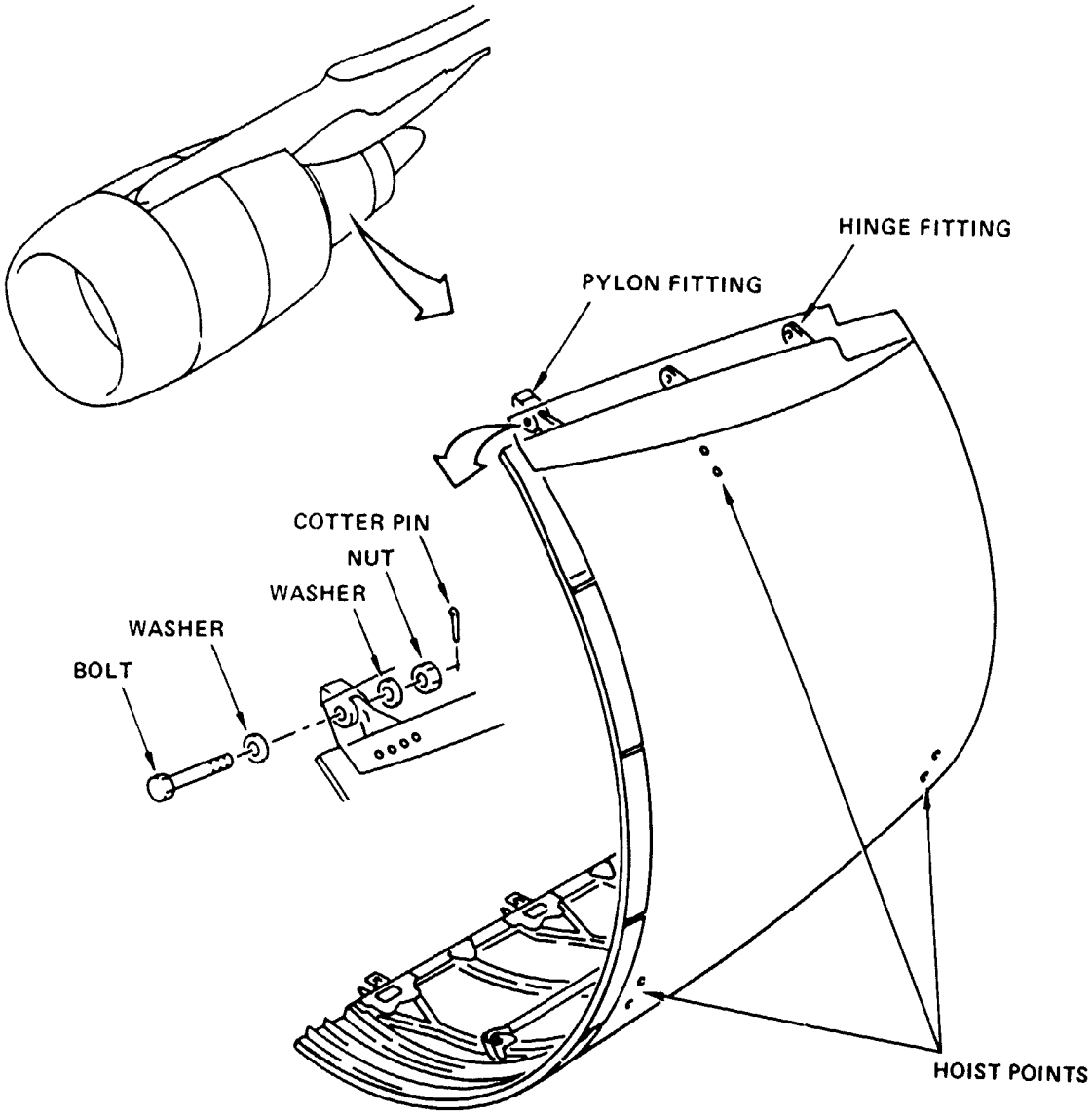
ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C.	Cotter Pins
D. RSE1037	Pin-Locating
E. RSE1039	Core Cowl Dolly
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-01, P. Block 501	Core Cowl Doors

3. Procedure

A. Job Set-Up
(1)Open safety and tag the circuit breakers for the appropriate engine and open core cowl doors (Ref. 71-13-00, P. Block 301).
(2)Install access platform.

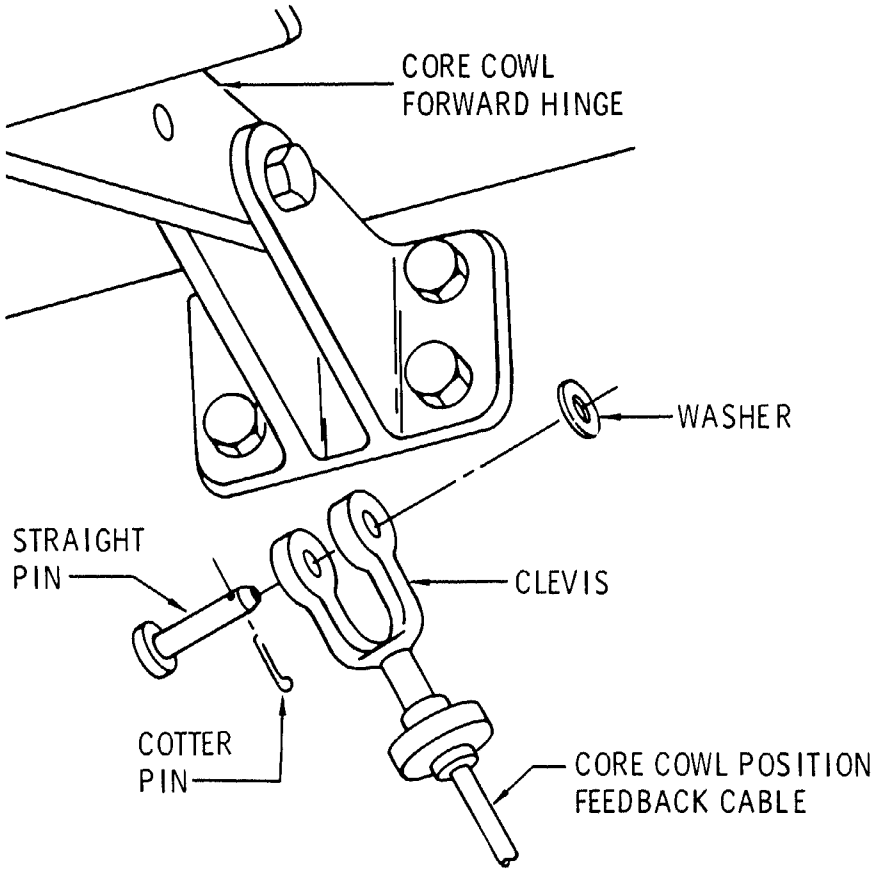
B. Removal (Ref. Fig. 401)
(1)Disconnect core cowl position feedback cable clevis end from the core cowl forward hinge by removing the cotter pin, washer and straight pin (Ref. Fig. 402).
(2)Support weight of door and stow hold-open rods.
(3)Remove cotter pins from hinge bolts.
(4)Remove door hinge bolts, washers and nuts.
(5)Remove door from engine and place on core cowl dolly, RSE 1039.

C. Installation (Ref. Fig. 401)
(1)Ensure thrust reverser is in fully opened position prior to core cowl installation.
(2)Raise core cowl door to installation position and align door hinge fittings with pylon fittings by inserting locating pins, RSE1037A, in bolt holes.
(3)Remove locating pins one at a time ; install forward, center and aft bolts (heads forward), washers and nuts in each of the hinges.
(4)TORQUE nut of center bolt to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN) and install cotter pin.
(5)Tighten nuts of forward and aft bolts fingertight and install cotter pins.
(6)Connect clevis end of core cowl position feedback cable to the core cowl forward hinge and secure with straight pin, washer and cotter pin (Ref. Fig. 402).



BM5 71 13 01 4 LAMO · 13 · 07
DM5

Core Cowl Door
Figure 401



BM5 71 13 01 4 LCMO - 17 - 12
DM5

Core Cowl Position Feedback Cable Disconnection
Figure 402

D. Inspection/Check
(1)Close core cowl doors (Ref. 71-13-00, P. Block 301).
(2)Check door gap and latch tension (Ref. 71-13-01, P. Block 501).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Remove safety clips and tags and close circuit breakers.

CORE COWL - ADJUSTMENT/TEST

1. General

A. This procedure provides instructions for adjustment and test of the core cowl doors gap and latch tension.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Push-Pull Gage DPPH-100
C.	Torque Wrench 20-25 lbf.in. (0.23-0.28 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up
(1)Open, safety and tag circuit breakers for the appropriate engine (Ref. 71-13-00, P. Block 301).

B. Core Cowl Adjustment (Ref. Fig. 501)
(1)Withcore cowl doors closed, measure gap at core cowl door bottom centerline to determine shim adjustment requirements.
NOTE : Normal gap is 0.06 - 0.18 in. (1.52 - 4.57 mm).
(2)Open core cowl doors (Ref. 71-13-00, P. Block 301).
(3)Remove screws, washers, and nuts attaching plate and shims to left core cowl door. Slide plate away from door on clevis shaft to reach shims.
(4)Adjust plate and shims at forward latch to obtain approximately 60 % contact between core cowl and fan reverser at core cowl/fan reverser interface.
Install plate and shims with screws, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(5)Adjust plate and shims at aft latch to maintain average gap of 0.030 in. (0.762 mm) between core cowl hat sections and primary nozzle rub strips. Install plate and shims with screws, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
NOTE : The bottom centerline gap may taper from front to rear provided it remains within the tolerance range.
(6)Measure gap at core cowl door bottom centerline. If required, use a minimum of shim readjustment to bring gap just within the tolerance range of 0.06 - 0.18 in. (1.524 - 4.574 mm).
(7)Adjust plate and shims at center latch to fill gap between latch housing and latch keeper bracket. Install plates and shims with screws, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

C. Core Cowl Latch Tension Adjustment
(1)Open forward core cowl latch. Make certain remaining latches are engaged.

Insert 5/32 in. (6 mm) hexagonal wrench through access hole and into adjusting nut of latch.

(2)Rotate adjusting nut to obtain latch closing force between 50 and 100 lbf (22.24 and 44.48 daN). Measure closing force at tip of latch with push-pull gage. Check that latch can be closed using hand pressure only.

(3)Check latch closing tension of remaining latches. Adjust as necessary to obtain closing force between 50 and 100 lbf (22.24 and 44.48 daN).

(4)Close all core cowl door latches. Make certain that hand pressure only is required to close latches.

D. Rigging Procedure For New Core Cowls

WARNING : BEFORE LATCHING, POSITION CORE COWL DOORS SO THAT CORE COWL STOP IS FORWARD OF STOP ON PRIMARY NOZZLE. GAP BETWEEN THE RESPECTIVE STOPS IS ACCEPTABLE.

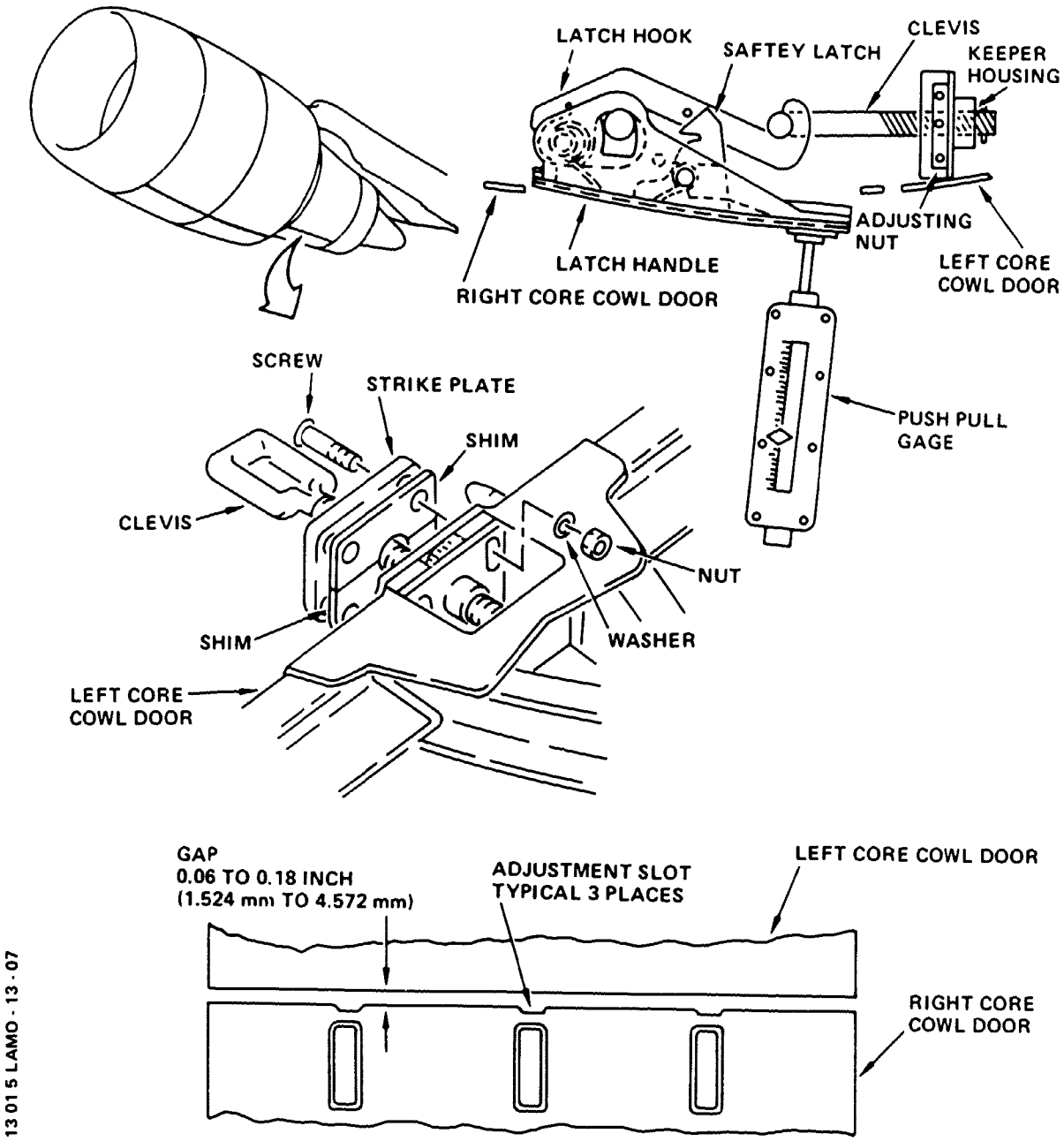
(1)Check gap at forward, center and aft latch locations to verify 0.200 in. to 0.220 in (5.08 to 5.598 mm) skin trim gap between core cowl halves at BL100, lower split line gap may vary.

(2)Adjust latch keeper with latch adjustment tool at each location until a force between 50 and 100 lbf. (22.24 and 44.48 daN) is required to close each latch handle when the adjacent latches are engaged. Use only hand pressure to close latches.

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close cowl doors, remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).



Core Cowl Door Latch Adjustment
Figure 501

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C.	Torque Wrench
D. RSE1165	Torque Adapter Tool
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the circuit breakers for the appropriate engine.

(2)Open fan cowl doors (Ref. 71-13-00, P. Block 301).

(3)Install access platform.

B. Visual Inspection/Check

(1)Allowable damage zones (Ref. Fig. 601)

There are five damage zones for the core cowl. The allowable damage zones for the core cowl sheet metal are identified by structural element. The allowable damage zones for the core cowl sheet metal structural elements are :

- CC1 - Panel skin
- CC2 - Frame, longeron, mount, and intercostal
- CC3 - Fairing
- CC4 - Fastener joint
- CC5 - Pressure relief door

(2)Allowable damage limits

DESCRIPTION	CRACK	DENT/ BUCKLE	GOUGE	HOLE	NICK	SCRATCH	TEST
Zone CC1	A	C	E	F	G	E	
Zone CC2	A	D	E		G	E	
Zone CC3	B	C	E	F	G	E	
Zone CC4		C	E	F	G	E	
Zone CC5	----------Unlimited----------						H

R A- Between fasteners in a joint of 10 or more fasteners. 1.0 in. (25.4 mm) maximum. Check at "A" check. Repair at "C" check. Length 1.0 to 3.0 in. (25.4 to 76.2 mm). Stop drill crack. Crack between two adjacent fasteners in joint containing at least 10 fasteners. Minimum 10 in. (254.0 mm) separation from other defects. Stop drill crack.

R B- Length must be less than 1.0 in. (25.4 mm) in bend area and less than 25 percent of the flange width. Stop drill crack.

R C- Located minimum or 20 times sheet thickness from edge of panel. Dent diameter must be at least 10 times larger than dent depth. Minimum 10 in. (254.0 mm) from other defects. Width 5 in. (127.0 mm) maximum.

R D- Located in stiffener flange. Maximum dimension is 5.0 in. (127.0 mm). No dents allowed closer than 5.0 in. (127.0 mm) to a stiffener termination point. Check at "A" check. Repair at "C" check.

R E- 10 in. (254.0 mm) in any direction. If depth is greater than 25 percent of material thickness, regard as crack. Minimum 10 in. (254.0 mm) separation from other defects.

R F- Maximum 1.0 in. (25.4 mm) diameter within 20 times material thickness from panel support members. 3.0 in. (76.2 mm) maximum diameter for other areas.
Check at "A" check. Repair at "C" check.
*Seal with tape. Holes in fireshield must be repaired before next flight.

R G- 25 percent of material thickness, 0.10 in. (2.54 mm) wide.

R H- Door shall open freely and close without binding. Inspect per Aircraft Maintenance Manual (AMM).
* Tape - 3M Type 425 or equivalent.

R (3)Examine the blow-out door latch for unwanted dirt/grime. If there is too much dirt/grime, clean the latch as follows :

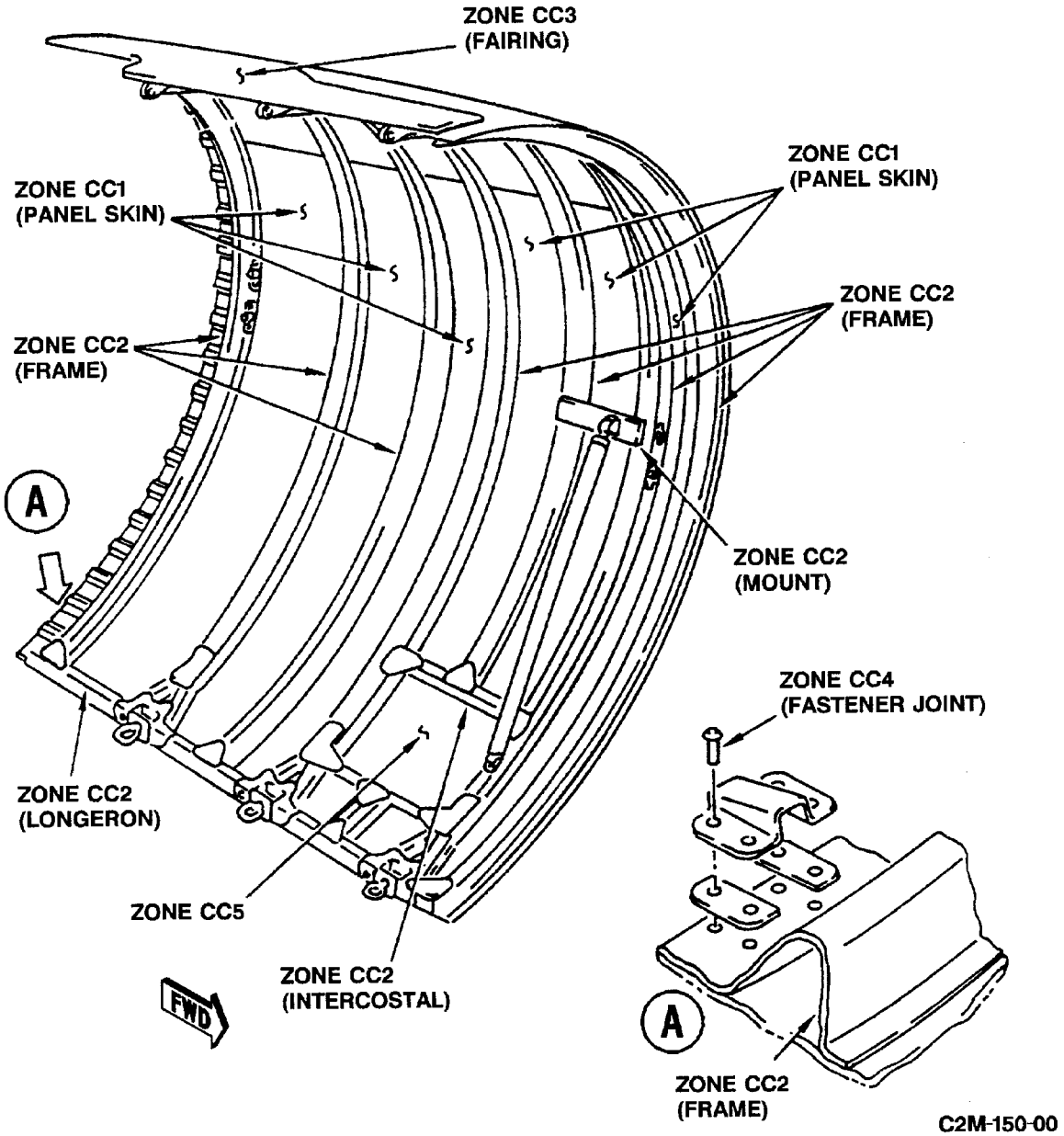
R WARNING : BEFORE YOU USE CHEMICALS, READ, UNDERSTAND, AND OBEY ALL SAFETY INSTRUCTIONS FOR THE CHEMICALS. THESE INSTRUCTIONS INCLUDE INSTRUCTIONS FROM THE MANUFACTURER, THE MATERIAL SAFETY DATE SHEET (MSDS), AND GOVERNMENT REGULATIONS. CHEMICALS MAY CAUSE INJURY TO YOU OR MAKE YOU SICK WHEN SAFETY INSTRUCTIONS ARE NOT OBEYED. AN MSDS GIVES INSTRUCTIONS ON HOW YOU MUST SAFELY USE, KEEP, AND DISCARD CHEMICALS. GET INSTRUCTIONS FROM YOUR EMPLOYER ON HOW YOU MUST SAFELY USE, KEEP, AND DISCARD CHEMICALS.

R (a)Use a brush wet C04-001 to rub all the areas of dirt/grime. Rub the areas clean before the C04-001 becomes dry.

R (b)Do the above steps as you do step 2.D.(1), then do this step again. If the latch torque is more that specified after the second cycle, then replace the latch.

C. Pressure Relief Door Open

(1)An open pressure relief door is a not-serviceable condition and the following should be performed.
(a)Reset the pressure relief door.
(b)Inspect pneumatic ducts under cowl for leaks.
(c)If no leaks found, check door latch tension per paragraph D.



BM5 71 13 01 6 LAMD 01

Core Cowl Damage Zones
Figure 601

R

D. Check of the Pressure-Relief Door Latches on the Core Cowl (Ref. Fig. 602)
This procedure is to make certain the pressure-relief door latches are not stuck and that they will release at the correct pressure.

(1) Make sure each latch is clean.

(2) Make sure the pressure-relief door is closed and the two latches are engaged.

(3) Calculate the minimum and maximum indication on the torque wrench necessary to open the latches. The minimum and maximum permitted loads to release the latch are:

R - 92 lbf (40.9 daN) minimum and

R - 102 lbf (45.4 daN) maximum.

The indication of the load on the torque wrench is given by the formula that follow:

$$\text{Torque value} = 0.5 \text{ in. } (P) \left(\frac{L}{L + 1.5 \text{ in.}}\right)$$

$$\text{Torque value (metric): } 12.7 \text{ mm } (P) \left(\frac{L}{L + 38.1 \text{ mm}}\right)$$

R Where: P = Latch release load of 92-102 lbf (40.9 - 45.4 daN)
L = Torque wrench length in inches and meters (from center of the torque wrench drive to the middle of the hand grip).

NOTE : The length of the torque wrench is the distance between the point where force is applied and the centerline of the torque wrench drive.

Example:

R The minimum latch release load (P) = 92 lbf (40.9 daN)
Torque wrench length (L) = 12.0 in. (304.8 mm)

R $0.5 \text{ in. X } 92 \text{ lbf } \left(\frac{12 \text{ in.}}{12 \text{ in.} + 1.5 \text{ in.}}\right) = 40.9 \text{ lbf.in.}$

R $0.0127 \text{ m X } 40.9 \text{ daN } \left(\frac{0.3048 \text{ m}}{0.3048 \text{ m} + 0.0381 \text{ m}}\right) = 0.46 \text{ m.daN}$

R The maximum latch release load (P) = 102 lbf (45.4 daN)
Torque wrench length (L) = 12.0 in. (304.8 mm)

R $0.5 \text{ in. X } 102 \text{ lbf } \left(\frac{12 \text{ in.}}{12 \text{ in.} + 1.5 \text{ in.}}\right) = 45.4 \text{ lbf.in.}$

R $0.0127 \text{ m X } 45.4 \text{ daN } \left(\frac{0.3048 \text{ m}}{0.3048 \text{ m} + 0.0381 \text{ m}}\right) = 0.51 \text{ m.daN}$

(4) Put the TORQUE ADAPTER TOOL (RSE1165) on the 3/8 in. (9.5 mm) drive torque wrench.

(5) Put the thin end of the TORQUE ADAPTER TOOL (RSE1165) tightly into the slot in the latch.

(6) Apply a right-angle force to the aft end of the cowl on the wrench. Slowly increase the force until the latch releases.

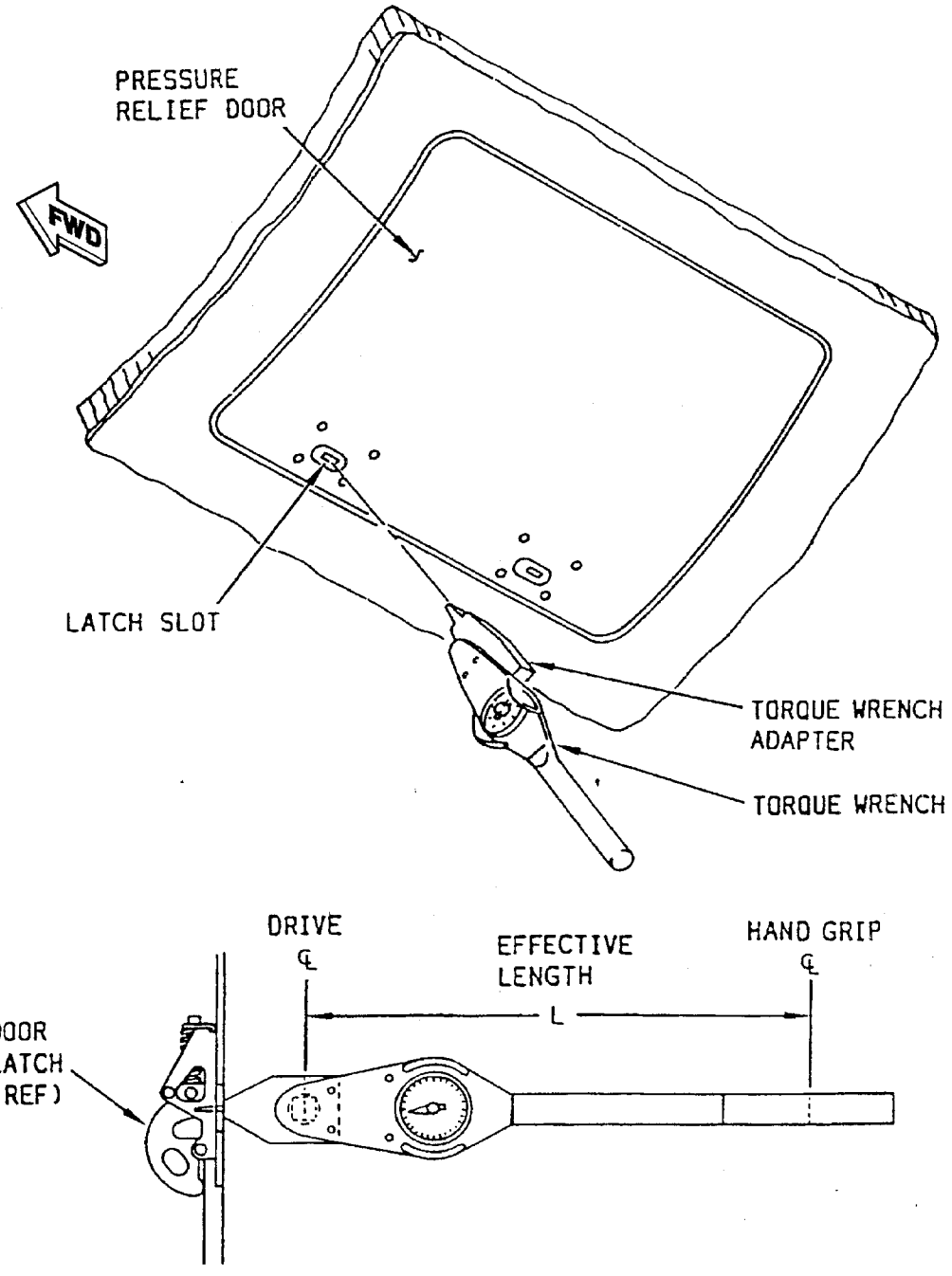
(7) Record the torque value on the wrench when the latch released.

(8) Do the test three times.

(9) Add the three values and divide by 3 for the torque value. If the torque value is not in the limits from step (3), replace the latch or pressure-relief door.

Example: Replace the latch or pressure-relief door if the torque value is
R more than 45.4 lbf.in. (0.51 m.daN) and less than 40.9 lbf.in.
R (0.46 m.daN).

(10) Do steps (2) through (9) for the second latch slot.



BM5 71 13 01 6 LCMD 02

Core Cowl Pressure Relief Door Test
Figure 602

R

R E. Visual Inspection/Check of the core cowl hinges (Ref. Fig. 601)

INSPECTION/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Core cowl hinges		
(a)Cracks, Scratches, Gouges	None Allowed.	Replace the damaged hinge.
(b)Looseness	Make sure there are no loose or missing parts.	Replace the loose or missing parts.

R F. Close-Up
(1)Remove access platform.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close cowl doors (Ref. 71-13-00, P. Block 301).
(4)Remove safety clips and tags and close the appropriate circuit breakers.

FAN COWL - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the fan cowl doors.

2. Equipment and Materials

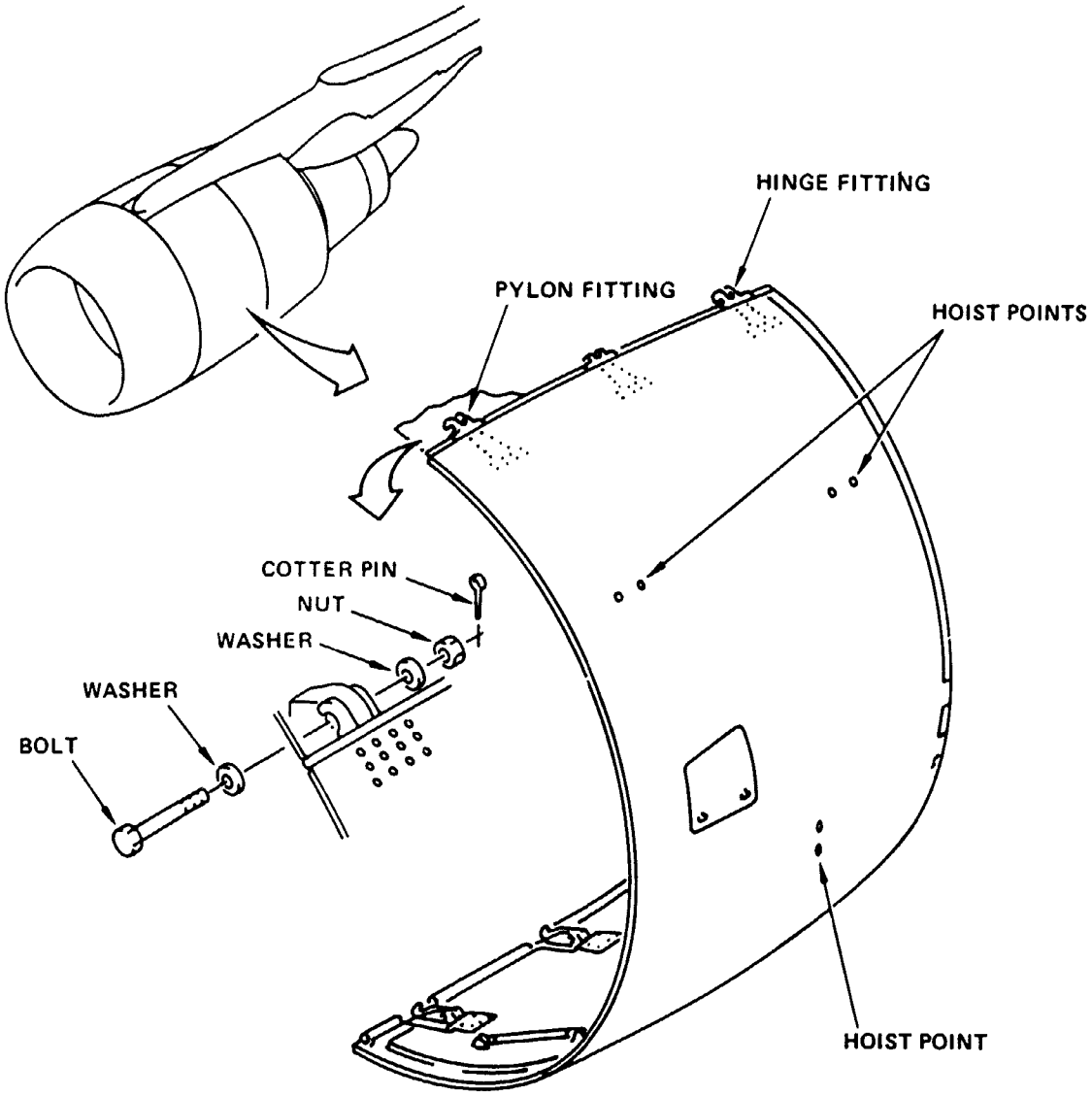
ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B. RSE1025	Fan Cowl Sling
C. RSE1028	Fan Cowl Dolly
D. RSE1037	Pin-Locating
E.	Access Platform
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-02, P. Block 501	Fan Cowl

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open fan cowl doors latches (Ref. 71-13-00, P. Block 301).
(2)Install access platform.

B. Removal (Ref. Fig. 401)
(1)Remove hoist point filler plugs and retain for reinstallation.
(2)Attach fan cowl sling, RSE1025, to fan cowl door hoist points, lift to support weight of door and remove fan cowl door as follows :
(a)Remove cotter pins from hinge bolts.
(b)Remove door hinge bolts, washers and nuts.
CAUTION : RAISING OR LOWERING FAN COWL DOOR AFTER REMOVAL OF HINGE BOLTS MAY DAMAGE UPPER DOOR SEAL. ADJUST SLING TENSION CAREFULLY TO AVOID ANY MOVEMENT OF DOOR WHEN HINGE BOLTS ARE REMOVED. MOVE DOOR OUTWARD FROM PYLON TO AVOID SEAL DAMAGE.
(c)Remove door from engine and place on fan cowl dolly, RSE1028A.
(d)Remove sling and install hoist point filler plugs.

C. Installation (Ref. Fig. 401)
(1)Install fan cowl door as follows :
(a)Raise fan cowl door to position for installation and align fan cowl door hinge fittings with pylon fittings by inserting locating pins, RSE1037A, in bolt holes, forward, center, and aft.
(b)Remove locating pins one at a time and install forward, center and aft bolts, washers and nuts in each of the hinges, with bolt heads forward. Tighten nuts fingertight and install cotter pins.
(c)Remove sling and install hoist point filler plugs.
(2)Close fan cowl doors (Ref. 71-13-00, P. Block 301).



BM5 71 13 02 4 LAMO · 13 · 07
DM5

Fan Cowl Door
Figure 401

(3)Check fan cowl door gap and latch tension (Ref. 71-13-02, P. Block 501).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove safety clips and tags and close circuit breakers.

FAN COWL - ADJUSTMENT/TEST

1. General

This procedure provides instruction for adjustment of the fan cowl door gap and latch tension.

NOTE : Check latch tension at "C" check intervals ; check latch tension any time a fan cowl, inlet cowl, or reverser cowl is changed.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Push-Pull Gauge DPPH-100
C.	Torque Wrench 10-50 lbf.in. (0.11-0.56 m.daN)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-05, P. Block 401	Fan Cowl Door Latches

3. Procedure

A. Job Set-Up

Open, safety and tag circuit breakers for the appropriate engine (Ref. 71-13-00, P. Block 301).

B. Fan Cowl Adjustment (Ref. Fig. 501)

(1) With fan cowl doors closed, measure gap at bottom centerline to determine shim requirements.

NOTE : Normal gap is 0.060 to 0.275 in. (1.524 to 6.985 mm).

NOTE : If the centerline gap can not be adjusted below the maximum gap allowed (0.275 in. (6.985 mm)), refer to Service Bulletin GE 71-064.

(2) Open fan cowl doors (Ref. 71-13-00, P. Block 301).

NOTE : Check the star retention springs for damage prior to adjustment, replace the keeper assembly if star retention springs are bent, broken or missing (Ref. 71-13-05, P. Block 401).

(3) Remove screws, washers and nuts attaching plates and shims to left fan cowl door latch housings. Remove plates and shims and retain for reinstallation.

CAUTION : WHEN ADJUSTING THE FAN COWL DOOR LATCH TENSION USE ONLY THE 5/32 IN. (4 MM) HEXAGONAL WRENCH. THE USE OF ANY OTHER TOOL MAY CAUSE DAMAGE TO THE LATCH.

(4) Close fan cowl doors and engage forward and aft latches only. Insert 5/32 in. (4 mm) hexagonal wrench through access hole and into adjusting nut.

Rotate adjusting nut to obtain latch closing force between 10 and 50 lbf. (4.44 and 22.24 daN) at both ends.

NOTE : The bottom centerline gap may taper from front to rear provided it remains within the tolerance range.

NOTE : If the centerline gap can not be adjusted below the maximum gap allowed (0.275 in. (6.985 mm)), refer to Service Bulletin

GE 71-064.

(5)Measure bottom centerline gap. If required, use a minimum of shim adjustment at forward and aft latches to bring gap just within the tolerance range of 0.06 to 0.275 in. (1.52 to 6.985 mm). Install plates and shims at both latches with screws, washers and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(6)Adjust plates and shims at center latch to fill gap between latch keeper and latch housing. Install plates and shims with screws, washers and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN). Make certain adjustment of forward and aft latches is maintained.

C. Fan Cowl Door Latch Tension Adjustment

(1)Open forward fan cowl door latch. Make certain remaining latches are engaged. Insert 5/32 in. (4mm) hexagonal wrench through access hole and into adjusting nut of latch.

(2)Rotate adjusting nut to obtain latch closing force between 45 and 55 lbf. (20.01 and 24.46 daN.). Measure closing force at tip of latch with push-pull gauge. Check that hand pressure only is required to close latch.

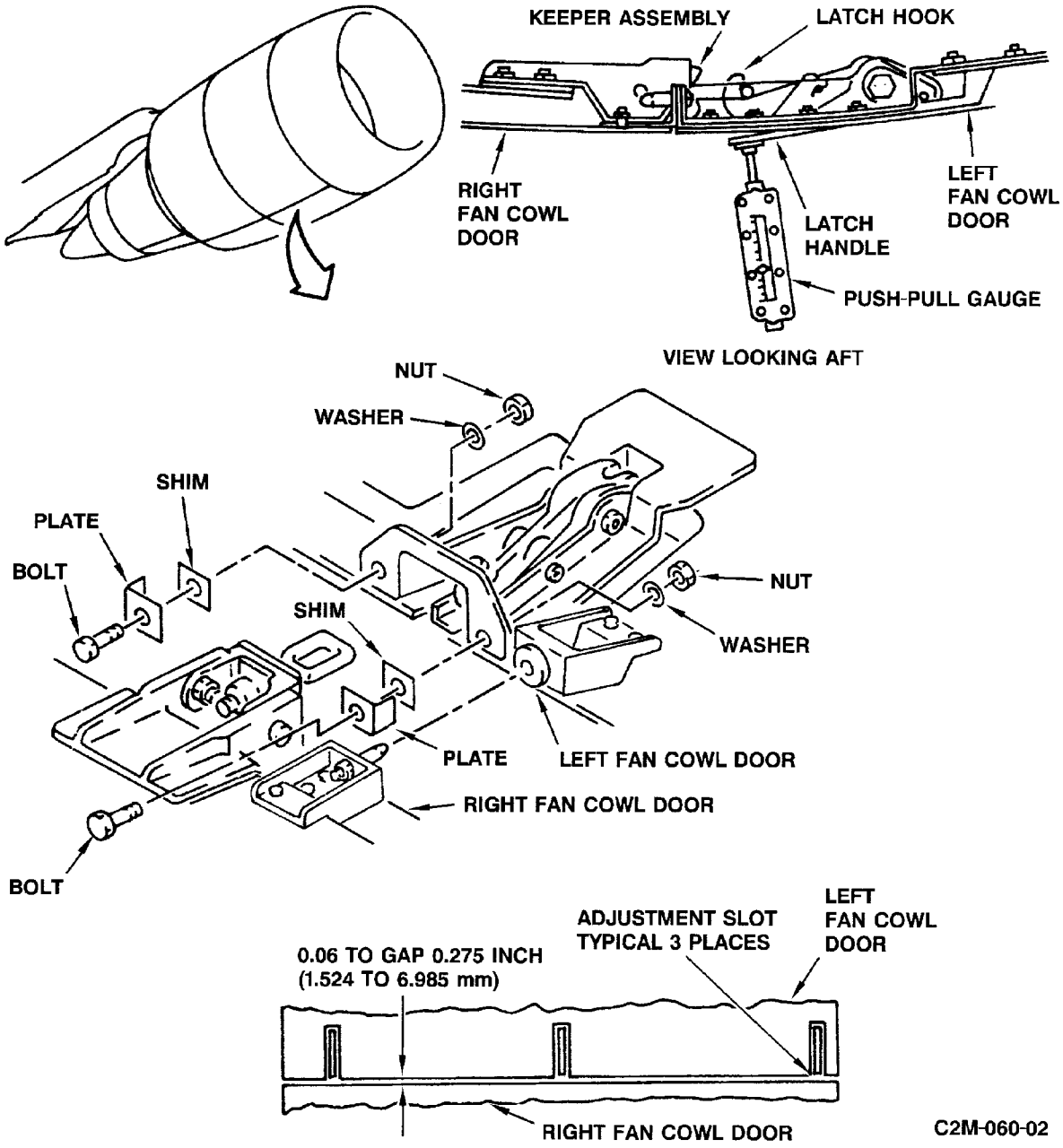
(3)Check tension of remaining latches. Adjust as necessary to obtain closing force between 45 and 55 lbf. (20.01 and 24.46 daN).

(4)Close all fan cowl door latches. Make certain that hand pressure only is required to close latches.

C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).



BM5 71 13 02 5 LAMO 01

Fan Cowl Door Adjustments
Figure 501

FAN COWL - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
R C.	Warning Tags
R D.	Aerodynamic Tape
R E.	Torque Wrench
R F. RSE1165	Torque Adapter Tool
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the circuit breakers for the appropriate engine.
R (2)Safety precautions.
R (a)Put a warning tag on the appropriate panel to tell any maintenance
R persons not to start the engine.
R (b)Make sure the applicable engine (1 or 2) has been shut down for at
R least 5 minutes.
R (c)Make sure the ENG MASTER switches (1 and 2) are in the OFF position.
R (d)Put a warning tag on the appropriate panel and tell maintenance.
R (3)Open fan cowl doors (Ref. 71-13-00, P. Block 301).
R (4)Install access platform.

B. Visual Inspection/Check
(1)Allowable damage zones (Ref. Fig. 601)
There are six damages zones for the fan cowl doors.
(a)The allowable damage zones for the fan cowl doors are :
D1 - Area 5.00 in. (127.0 mm) or less from hinge or latch fittings.
D2 - Edge zones of fan cowl door.
D3 - Area 3.00 in. (76.2 mm) or less from pressure relief door or hold-open rod.
D4 - The main body of the door which is full depth of sandwich panel.
D5 - The forward and aft fan cowl door lands.
D6 - Pressure relief door.
(2)Allowable damage limits

DESCRIPTION	ABRASION	CRACK	DISBOND	DENT	SCRATCH/ GOUGE	NICK	HOLE	TEST
Zone D1	A				D	E		
Zone D2	A	B	C		D	E		
Zone D3	A				D	E		
Zone D4	A	B	C	H	D	E	F	

DESCRIPTION	ABRASION	CRACK	DISBOND	DENT	SCRATCH/ GOUGE	NICK	HOLE	TEST
Zone D5	A	B			D	E	F	
Zone D6	UNLIMITED						NOT ALLOWED	G

NOTE : Any damage not described in the table must be repaired before next flight.

R A- Damage is allowable to surface finishes only. Fibers must not be damaged, apply *tape. Check at "A" check. Replace tape if peeled.

R B- In zone D2 and D5, maximum allowable length in fore-aft direction is 0.25 in. (6.4 mm). In zone D4, maximum allowable length is 3.00 in. (76.2 mm). In zone D5 allowable length in circumferential direction is 1.00 in. (25.4 mm). Not two cracks within 10.00 in. (254.0 mm). Maximum of five per fan cowl. Cracks wider than 0.10 in. (2.5 mm) are to be treated as holes. Cracks 0.01 in. (0.25 mm) deep or less to be considered as scratches. Unlimited use of terminated cracks between two adjacent fasteners in joint of 10 or more fasteners. Apply *tape. Check at "A" check. Repair at "C" check.

R C- In zone D2, maximum allowable length is 0.75 in. (19.05 mm) and maximum width is 0.25 in. (6.4 mm). In zone D4, maximum allowable lenght is 3.00 in. (76.2 mm). Not two disbonds within 10.00 in. (254.0 mm). Maximum of five disbonds per fan cowl door. Check at "A" check. Repair all disbonds at "C" check.

R D- Maximum allowable limits depth, 0.010 in. (0.25 mm) length 10.00 in. (254.0 mm) and width 0.10 in. (2.5 mm). Not two scratches/gouges within 10.00 in. (254.0 mm). Maximum of 10 gouges and 10 scratches per fan cowl door. Apply *tape. Check at "A" check. Repair at "C" check. Replace tape if peeled or damaged.

R E- Maximum allowable limit of 10.00 in. (254.0 mm) in any direction. Maximum of 14 nicks per fan cowl door. Apply *tape. Check at "A" check. Repair at "C" check. Replace tape if peeled or damaged.

R F- Maximum allowable limits : 1.00 in. (25.4 mm) diameter in zone D5 and 3.00 in. (76.2 mm) in zone D4. Apply *tape. Check at "A" check. Repair at "C" check. Replace tape if peeled or damaged.

R G- Door must open and close without binding. Inspect per Aircraft Maintenance Manual.

* Tape - Commonly referred to as "speed tape", 3M Type 425 or

equivalent

R H- Maximum diameter of dents is 12.00 in. (304.8 mm) with no torn fibers or disbonds. Dents are to be smooth in appearance with no sharp edges.

C. Pressure Relief Door Open

(1)An open pressure relief door is a not-serviceable condition and the following should be performed.

(a)Reset the pressure relief door.

(b)Inspect pneumatic ducts under cowl for leaks.

(c)If no leaks found, check door latch tension per paragraph D.

D. Blow Out Pressure Check (Ref. Fig. 602, 603)

This procedure is to make certain the blow out door latches are not stuck and that they will release at the correct pressure.

Use a torque wrench with a 3/8 in. (9.5 mm) drive and the latch adapter (RSE1165).

(1)Calculated Torque Value Range.

Calculate the minimum and maximum indicated torque wrench values which will be necessary to open the latches. Use the formula :

$$\text{TORQUE value} = 0.53P \times \frac{L}{(L + 1.5)}$$

Where : P = Latch release load

T = Effective length of the torque wrench

NOTE : The effective length of the torque wrench is specified as the distance between the point where the force is applied (this is where the center of your hand is when positioned on the wrench, or the middle of the wrench handle grip) and the centerline of the torque wrench drive.

The release load for the fan cowl pressure relief door latch is between 70 and 80 lbf (31.14 and 35.58 daN).

(2)Test Procedure.

NOTE : A torque wrench with a 3/8 in. (9.5 mm) drive and a torque wrench adapter (RSE1165) is used to do this procedure.

(a)Refer to step (1) of this section to calculate the minimum/maximum torque range values for the test.

(b)Make sure the door is closed and both latches are engaged.

(c)Put the torque wrench adapter on the torque wrench.

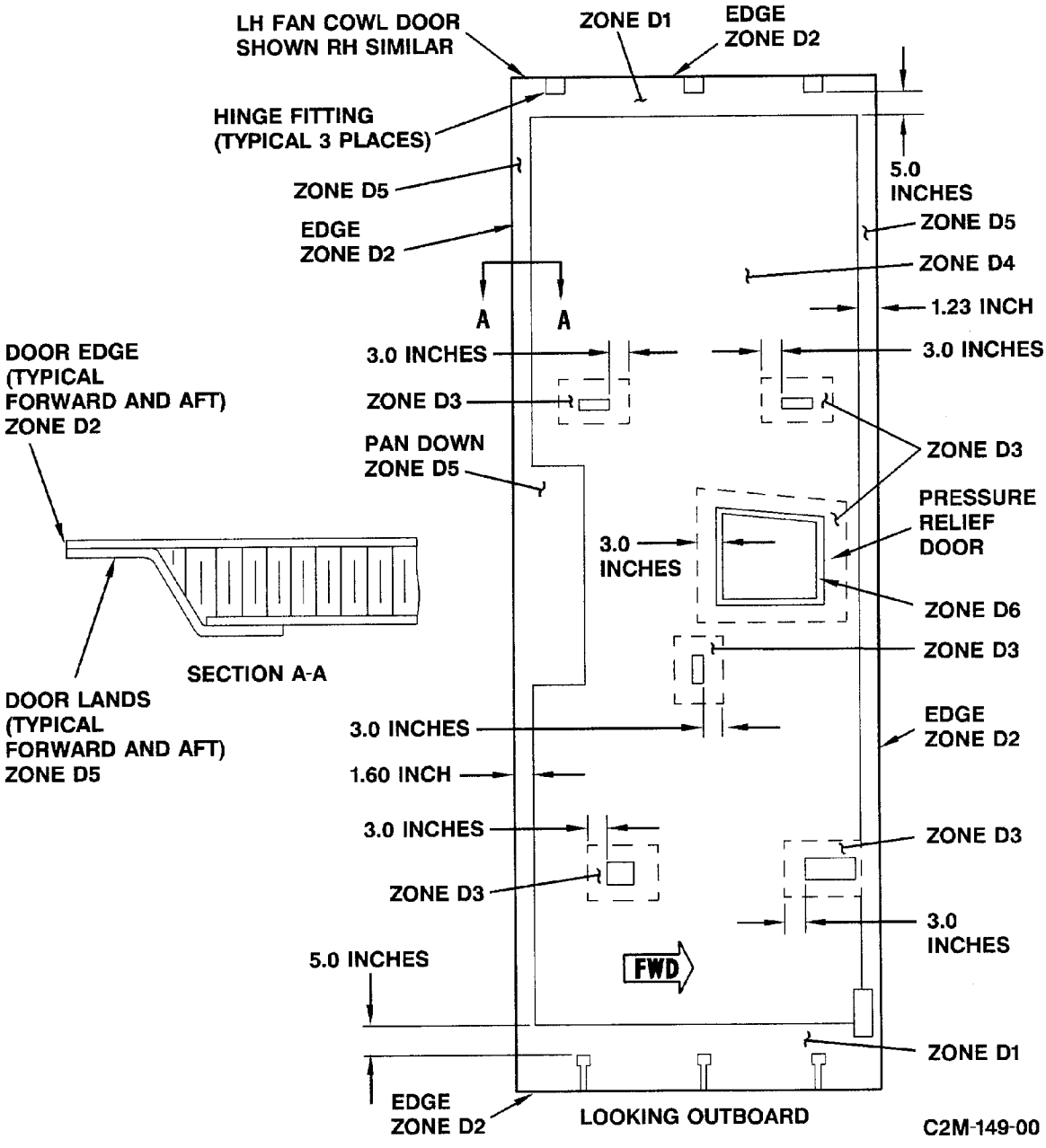
(d)Insert the narrow end of the adapter into one of the slots in the latch. Make sure the adapter fits tightly in the slot.

(e)Apply a downward right-angle force on the wrench until the latch releases. Make a record of the indicated torque-wrench value.

(f)Repeat steps (b), (d) and (e) for the second latch slot.

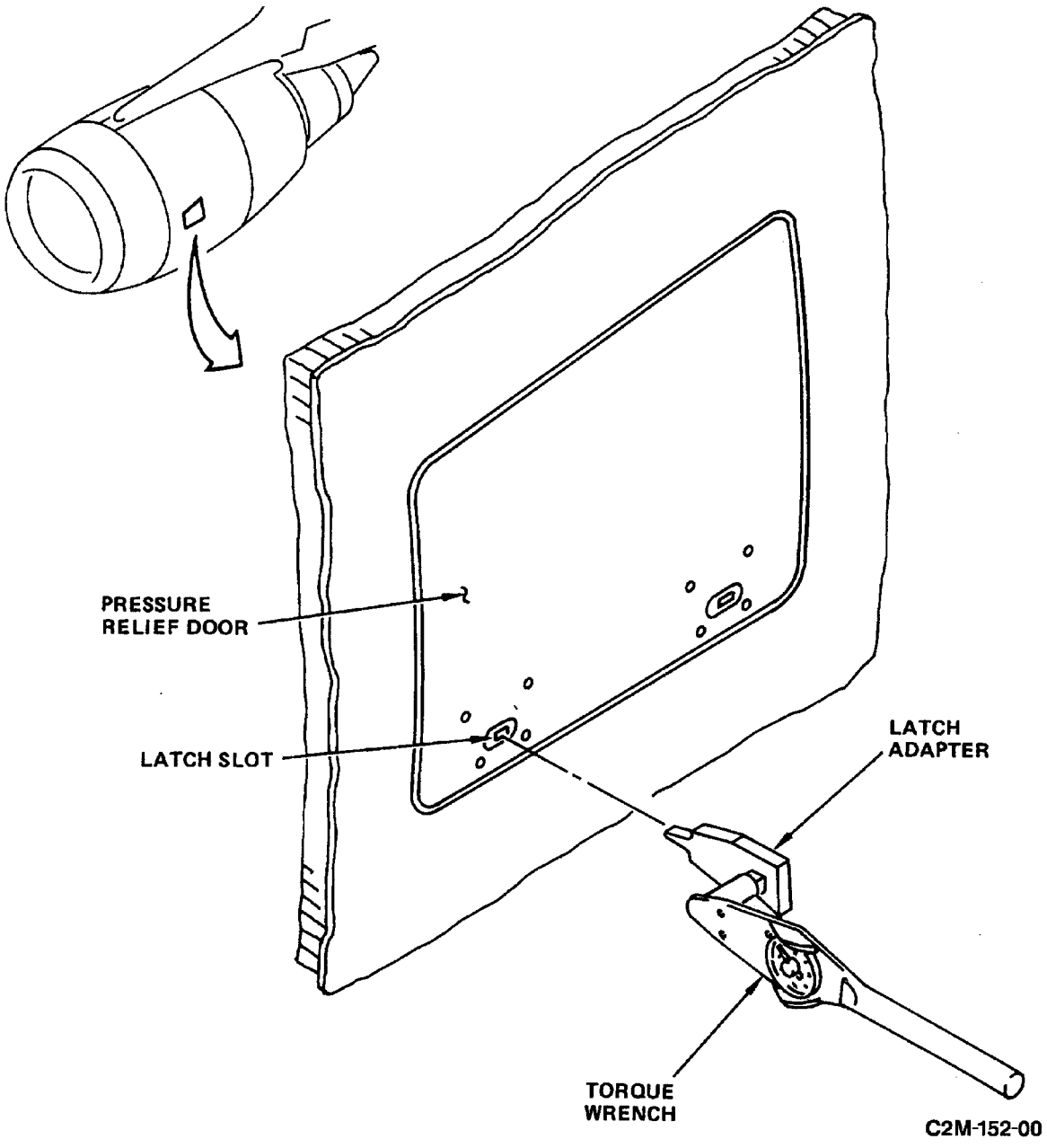
(g)If the indicated torque values are less than or more than the calculated torque values, replace the latch or door.

R E. Visual Inspection/Check of the fan cowl hinges



BM5 71 13 02 6 LAMD 01

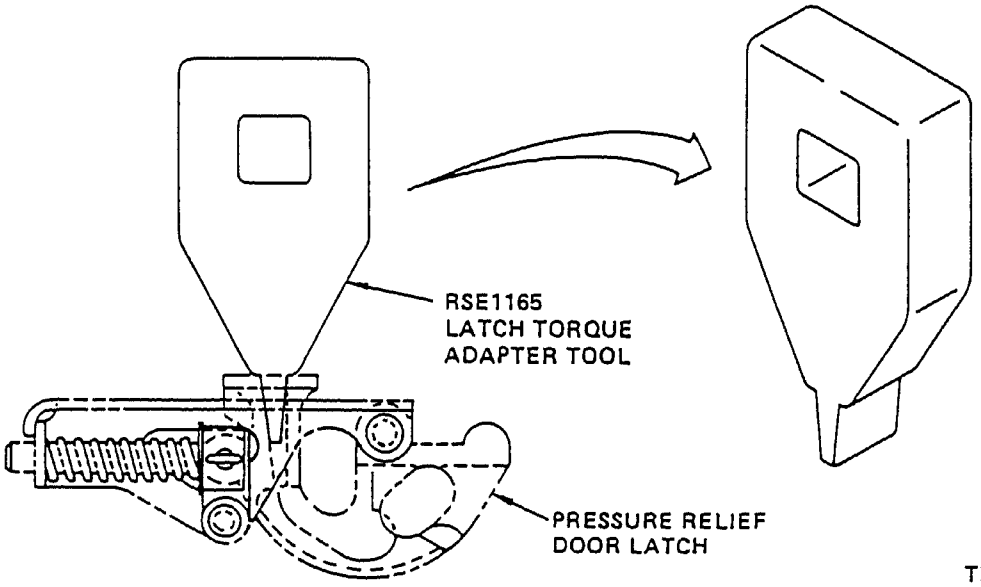
Fan Cowl Allowable Damage
Figure 601



BM5 71 13 02 6 LCM0 01

Fan Cowl Pressure Relief Door Test
Figure 602

R



BMS 71 13 02 6 LEMO - 01

Pressure Relief Door Torque Wrench Adapter
Figure 603

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Fan cowl hinges		
(a) Cracks, Scratches, Gouges	None Allowed	Replace the damaged hinge.
(b) Looseness	Make sure there are no loose or missing parts.	Replace the loose or missing parts.

F. Close-Up
(1)Remove access platform.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close fan cowl doors (Ref. 71-13-00, P. Block 301).
(4)Remove safety clips and tags and close circuit breakers for the appropriate engine (Ref. 71-13-00, P. Block 301).

**ON A/C 001-100,

R

FAN THRUST REVERSER COWL - REMOVAL/INSTALLATION

1. General
The fan reverser assembly consists of 2 halves. Both halves may be removed or installed without interfering with the basic engine installation. This procedure is written for removal/installation of the left-hand half with the right-hand half being opposite except where noted.

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C6983	Pump, Hydraulic - Power Opener
B. 97102A4241M000	Sling, Lift - Fan Reverser
C.	Circuit Breakers Safety Clips
D.	Access Platform
E.	Torque Wrench 12-1536 lbf. in. (0.13 - 17.36 m.daN)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-03, P. Block 501	Fan Thrust Reverser Cowl
- 71-13-08, P. Block 501	Fan Thrust Reverser Mounting Ring Latch Assembly
- 75-41-01, P. Block 401	Nacelle Temperature Sensor
- 78-31-00, P. Block 501	Thrust Reverser System Control
- 78-32-00, P. Block 601	Fan Reverser Assembly
- 78-32-00, P. Block 801	Fan Reverser Assembly

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open the fan cowl and thrust reverser doors (Ref. 71-13-00, P. Block 301).
CAUTION : THE FAN COWL DOOR MUST BE OPEN PRIOR TO REMOVING THE REVERSER HALF.
(2)Install access platform.
(3)Open the blowout and access doors.

B. Removal
(1)Open the three lower latches.
(2)Open the forward mounting ring latch assembly as follows :
(Ref. Fig. 401)
(a)Rotate upper latch handle outward and up to disengage upper latch hook from the U-bolt and also to disengage the lower latch handle pin from the upper latch handle interlock slot.

(b)Do a visual check to make sure that the upper latch hook is fully disengaged from the U-bolt.

(c)Rotate lower latch handle downward and in to disengage the barrel nut of the lower latch from the adapter.

CAUTION : IF THE RIGHT-HAND REVERSER HALF IS BEING REMOVED, REMOVE THE POD TEMPERATURE PROBE TO AVOID DAMAGING THE PROBE IF THE REVERSER IS LAID ON THE UPPER AND LOWER DUCT SIDEWALLS AFTER REMOVAL.

(3)Remove screws securing hinge cover and remove hinge cover (Ref. Fig. 405).

(4)Attach lifting sling attachment fittings to the reverser fixed structure. (Ref. Fig. 402).

(5)Remove cotter pin, nut and washer and disconnect the throttle feedback cable from center drive unit (Ref. Fig. 406). Remove clamps, bolts, washers and nuts securing the cable to the reverser.

NOTE : Secure cable to fan cowl with tape to avoid interference with the reverser half during removal.

(6)Disconnect directional control crossover flex line from the upper firewall bulkhead fitting. (Ref. Fig. 403)

(7)Disconnect air supply line from the upper firewall bulkhead fitting. (Ref. Fig. 403)

(8)Disconnect the TLOD air supply line from the upper firewall bulkhead fitting. (Ref. Fig. 404).

(9)Disconnect the TLOD electrical connector from the upper firewall bulkhead. (Ref. Fig. 404).

(10)Disconnect the electrical connector from the fan reverser electrical harness at the mounting bracket on the upper firewall bulkhead. (Ref. Fig. 403)

(11)Using Hydraulic Pump, 2C6983, open the fan reverser half approximately halfway and attach lifting sling, 97102A4241M000, to the previously installed attachment fittings.

(12)Take up sling tension until weight of fan reverser half is off of the cowl door actuator.

(13)Relieve pump pressure and remove bolt, two flat washers, contersunk washer and nut securing the cowl door actuator to the pylon attachment fitting. Disconnect inlet line from actuator. (Ref. Fig. 403)

CAUTION : MAKE CERTAIN THAT SLING ATTACH FITTING AND SHACKLES ARE ALL SECURE.
EACH FAN REVERSER HALF WEIGHS APPROXIMATELY 750 LBS (340 KG).

**ON A/C 001-100,

R

(14)Remove cotter pins, nuts, washers, and bolts at the three hinges and carefully remove the reverser half from the pylon. (Ref. Fig. 405)

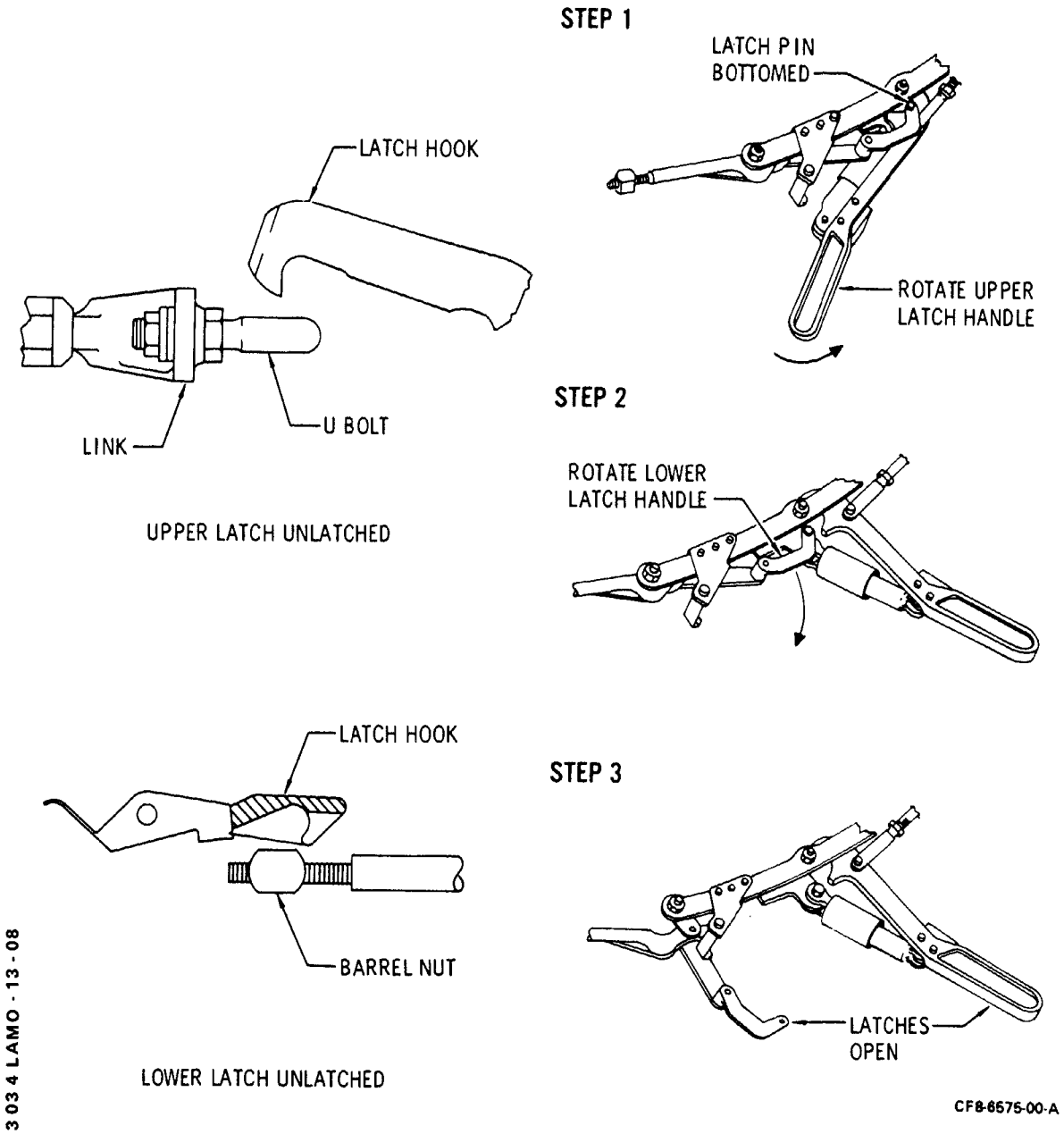
NOTE : If reverser half is being replaced, remove mounting ring latch assembly. Secure upper latch handle spring retainer to prevent

ejection of spring when assembly is removed.
(a)Examine the hinge bolts and washers for structural damage. Discard the bolts or washers if they are damaged (Ref. 78-32-00, P. Block 601).
(15)Place the reverser half on a suitable dolly and remove the lifting sling.

**ON A/C 001-100,

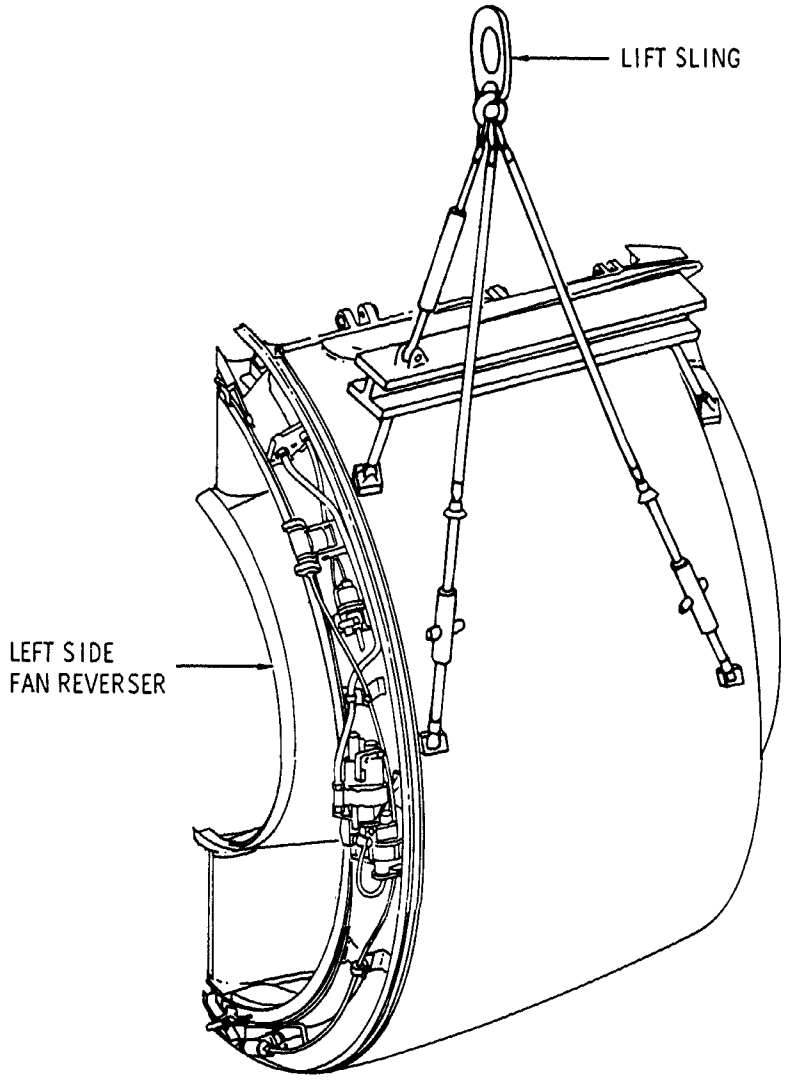
R

C. Installation of Fan Reverser Cowl Half
NOTE : During installation of any reverser half, confirm the proper deflector pattern by checking the positions as shown. (Ref. Fig. 407)
NOTE : If a configuration change is made to the fan reverser deflectors, the reverser halves must be reidentified on the name plate with the correct assembly identification number.
(1)If necessary, install the mounting ring latch assembly (Ref. 78-32-00, P. Block 801).
(2)Install lifting sling attachment fittings to the reverser fixed structure. (Ref. Fig. 402)
(3)Attach the lift sling, 97102A4241M000, to the attachment fittings and lift the reverser half in the maximum open position (45 degrees from engine centerline).
CAUTION : FAN COWL MUST BE OPEN PRIOR TO INSTALLING THE REVERSER HALF ONTO THE PYLON.
(4)Lower aft edge of reverser, aligning reverser hinge clevises and link with the pylon hinge blades. (Ref. Fig. 405)
CAUTION : MAKE SURE THAT THE THRUST REVERSER HINGE CLEVISES ARE CENTERED ON THE PYLON HINGE BLADES. IF NOT, DAMAGE TO THE THRUST REVERSER UPPER LATCH CAM AND/OR U-BOLT ASSEMBLY CAN OCCUR.
(5)Install hinge bolts (bolt head forward), washers and nuts. TORQUE nuts between 50 to 100 lbf.in. (0.57 and 1.13 m.daN) and install cotter pins.
NOTE : Make sure upper mounting pin bushings are aligned properly. If bushings are not aligned tap back into position
(6)Connect the electrical connector to the fan reverser electrical harness at the mounting bracket on the upper firewall bulkhead (Ref. Fig. 403).
(7)Connect the TLOD electrical connector to the upper firewall bulkhead (Ref. Fig. 404).
(8)Connect the TLOD air supply line to the upper firewall bulkhead fitting (Ref. Fig. 404).
(9)Connect the air supply line to the upper firewall bulkhead fitting (Ref. Fig. 403).
(10)Connect the directional control crossover flex line to the upper firewall bulkhead fitting (Ref. Fig. 403).
CAUTION : MAKE SURE THAT THE THRUST REVERSER UPPER LATCH CAM IS ENGAGED WITH THE U-BOLT FOLLOWER PLATE BEFORE YOU CLOSE THE THRUST REVERSER DOOR TO ATTACH THE COWL DOOR ACTUATOR. IF THE UPPER LATCH CAM IS NOT ENGAGED WITH THE U-BOLT FOLLOWER PLATE, DAMAGE TO THE EQUIPMENT CAN OCCUR.



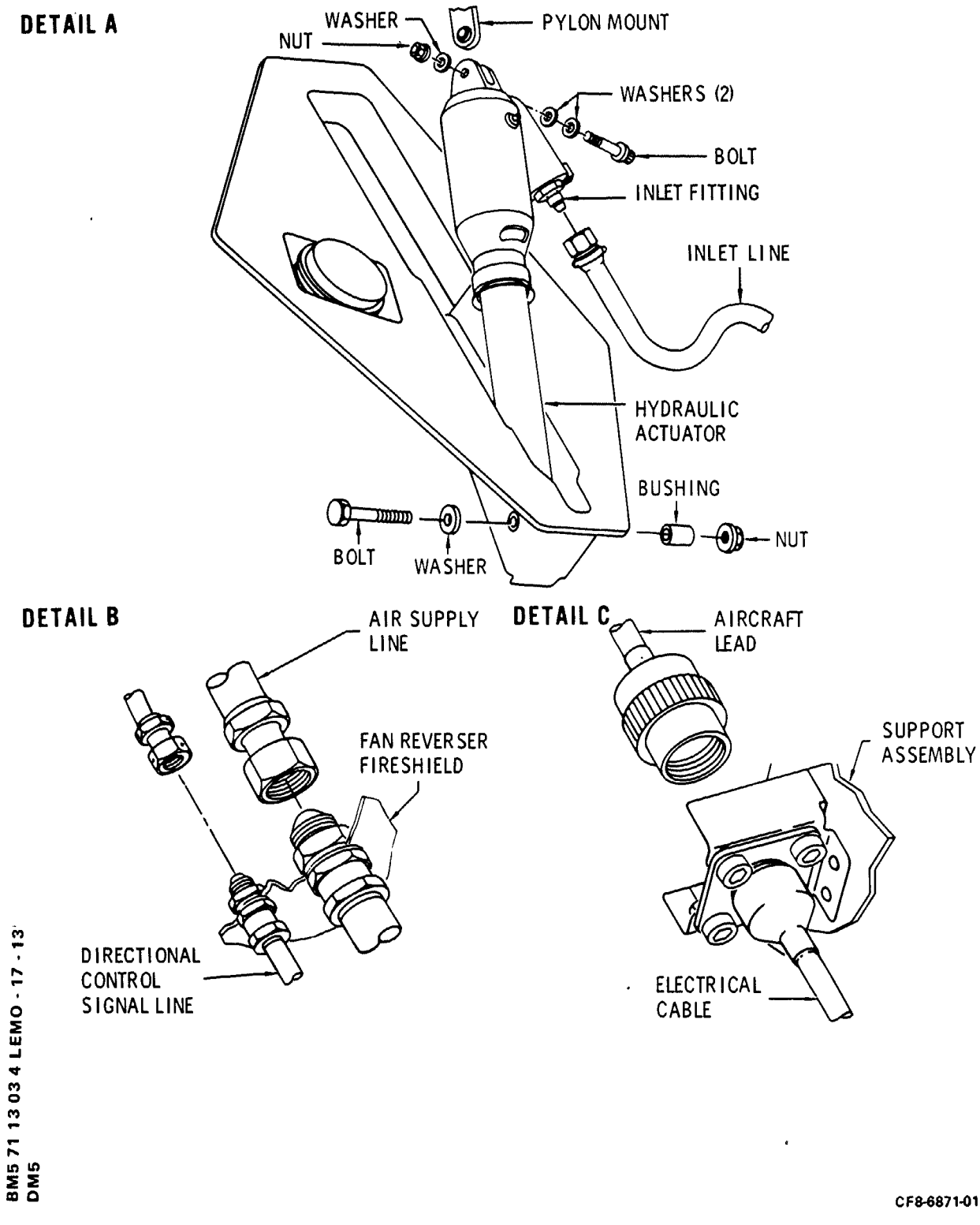
BM5 71 13 03 4 LAMO - 13 - 08
DM5

Opening of Mounting Ring Latch Assembly
Figure 401

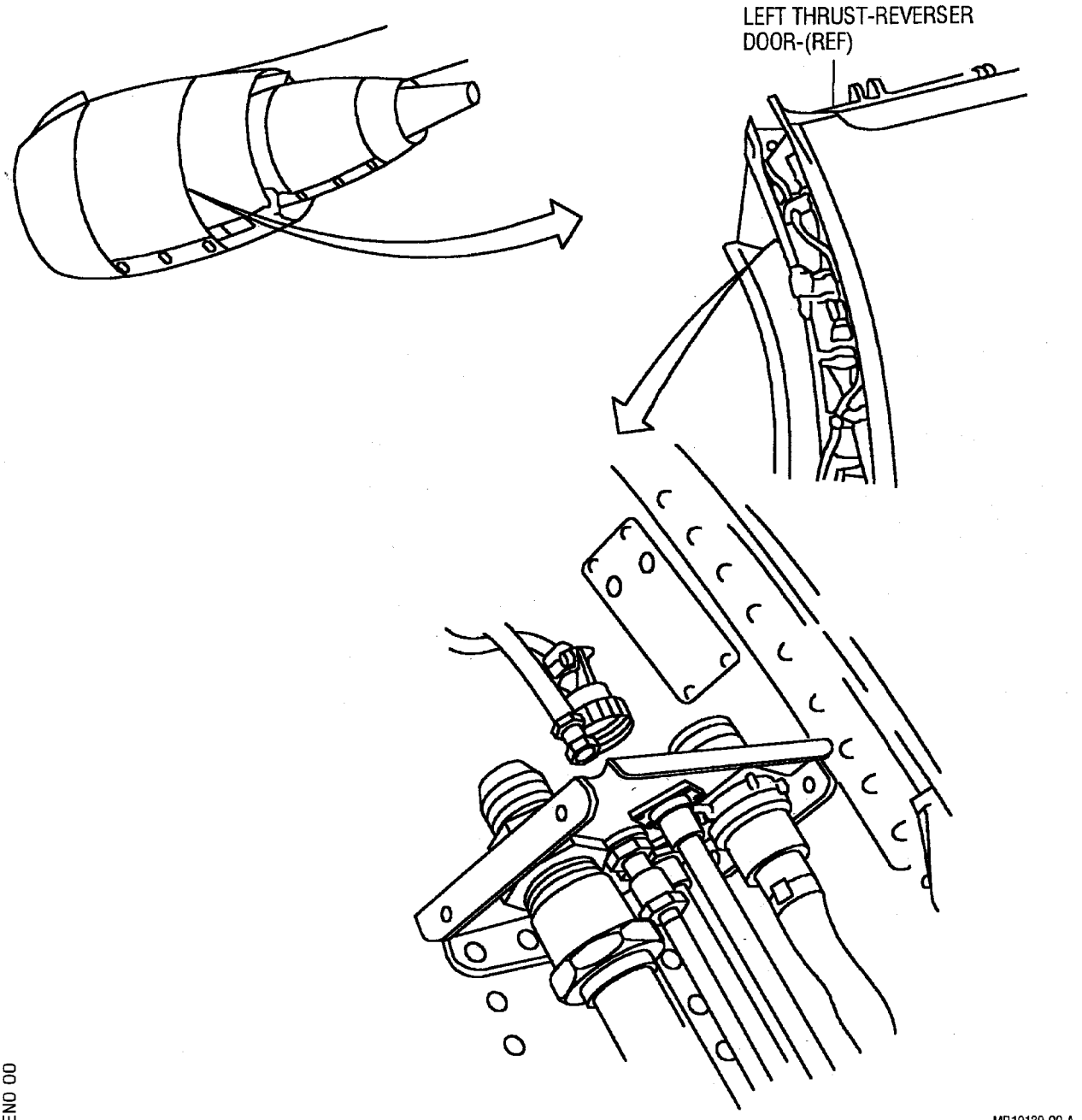


BM5 71 13 03 4 LCMO - 13 - 08
DM5

Fan Thrust Reverser Cowl - Removal/Installation
Figure 402

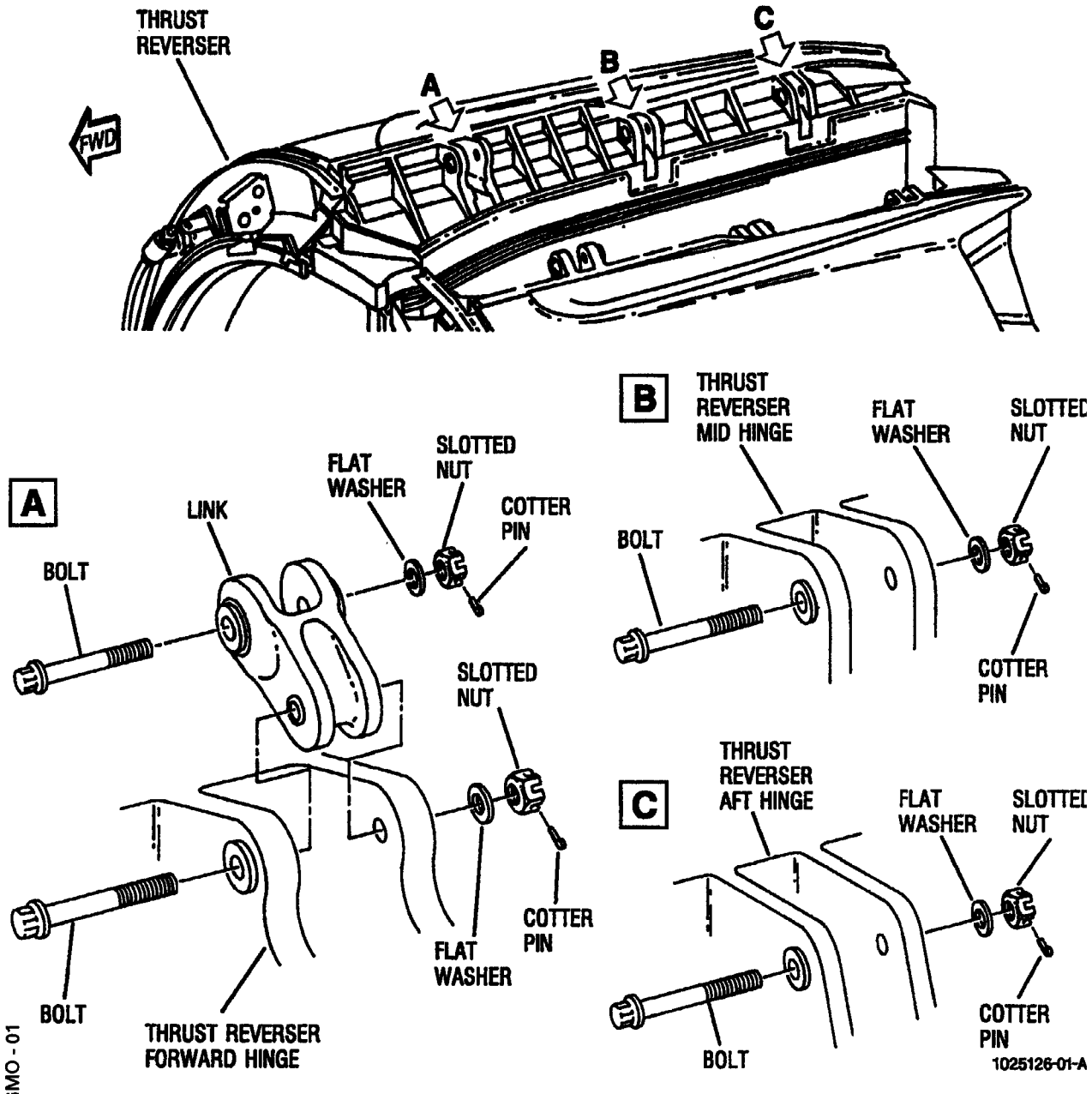


Fan Thrust Reverser Cowl - Removal/Installation
Figure 403

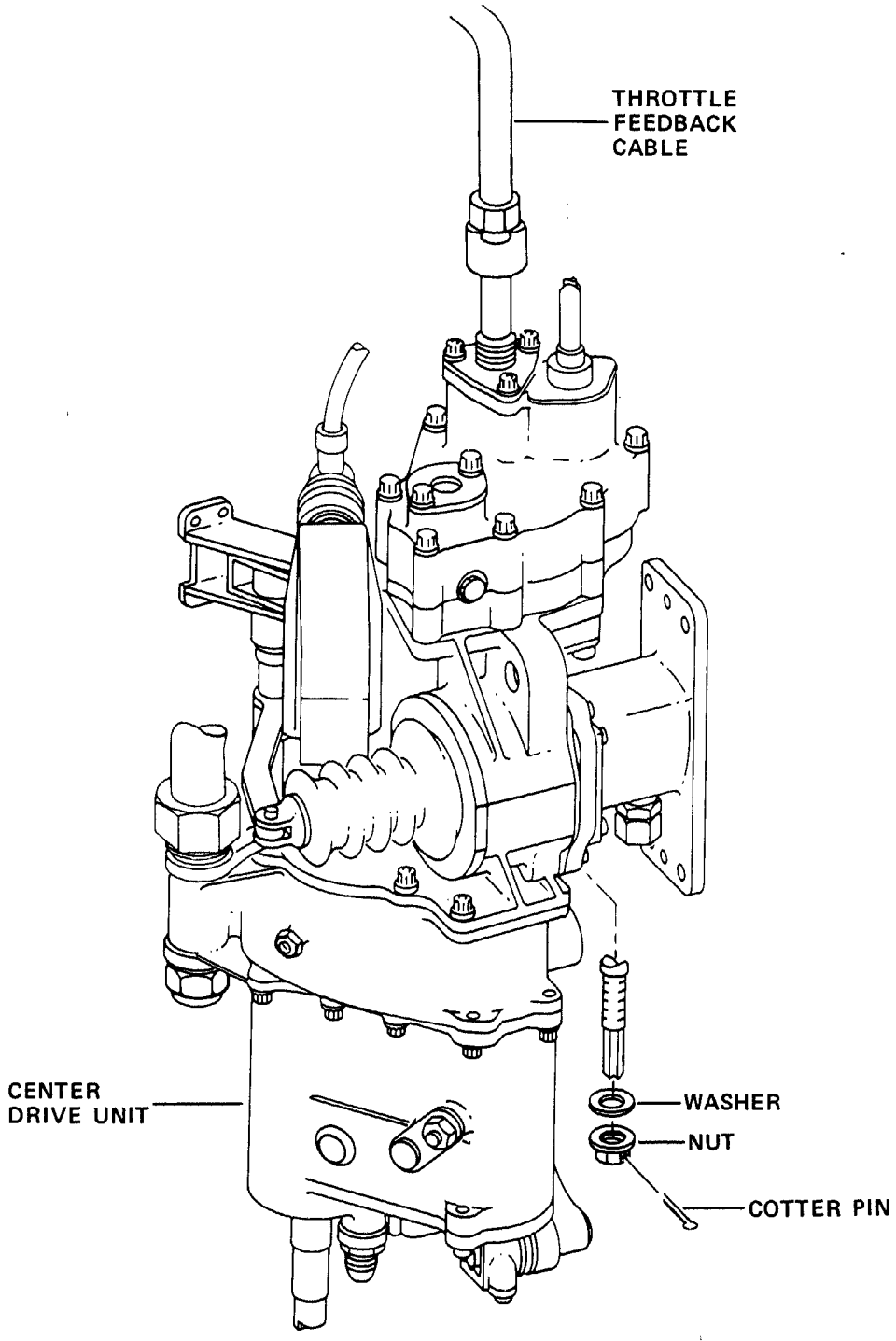


BM5 71 13 03 4 LENO 00

TLOD Air Supply Line
Figure 404



Fan Thrust Reverser Cowl - Removal/Installation
Figure 405

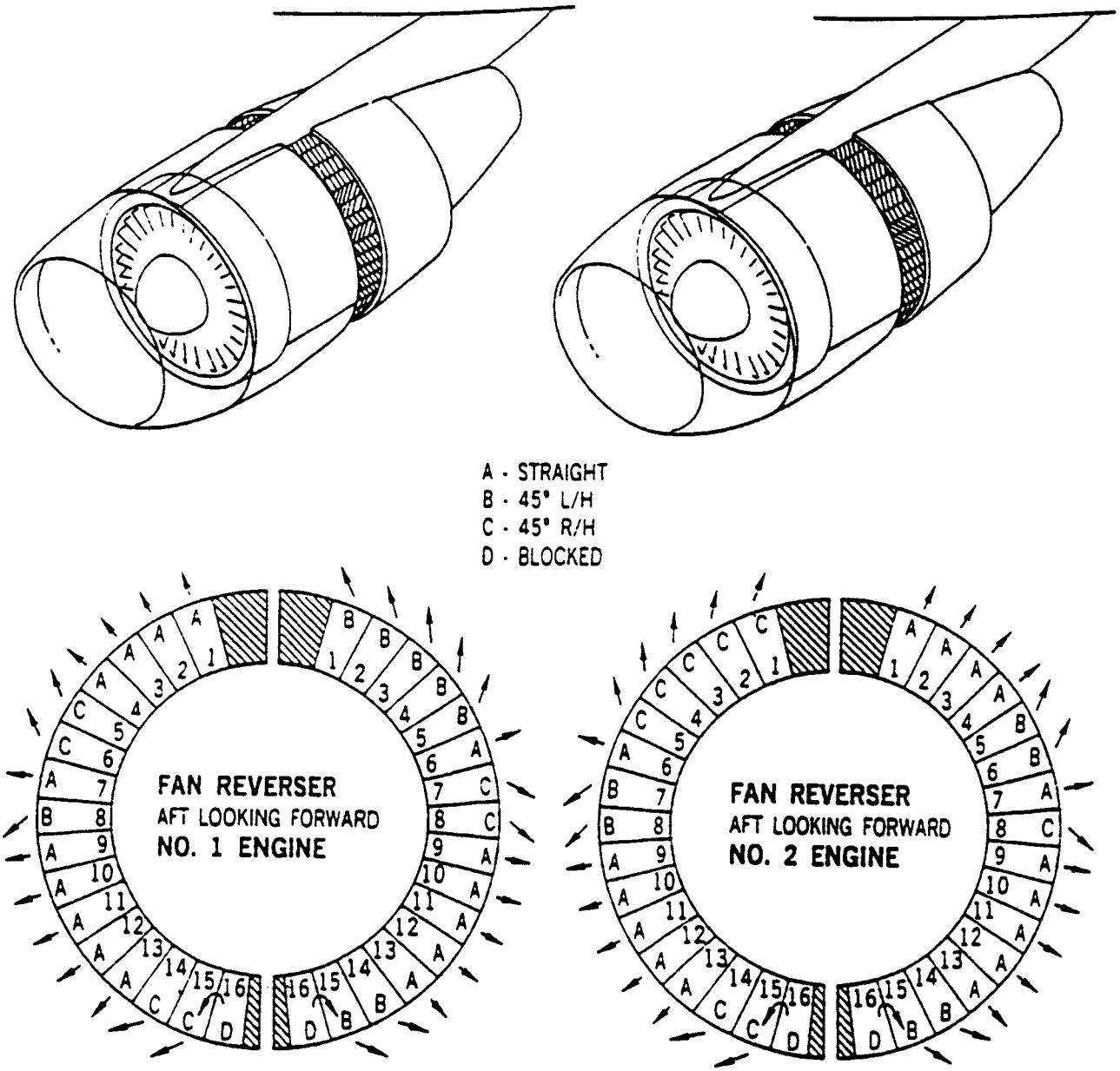


BM5 71 13 03 4 LPMO - 18 - 13
DM5

Throttle Feedback Cable Disconnection
Figure 406

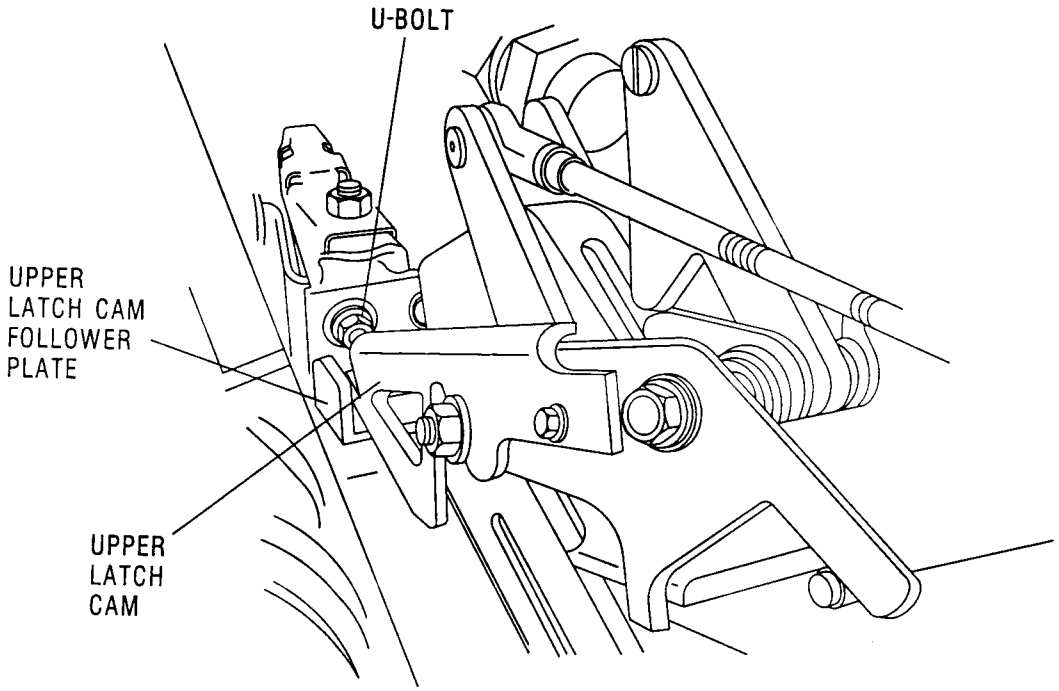
(11)Before you close the thrust reverser to attach the cowl door actuator, do a visual check to make sure that the thrust reverser upper latch cam is engaged with the U-bolt cam follower plate. (Ref. Fig. 408)
(12)Align cowl door actuator mounting clevis with pylon mount fitting and install bolt, countersunk washer, two flat washers and nut. TORQUE nut to between 80 and 100 lbf. in. (0.9 and 1.13 m.daN). Connect inlet line to actuator (Ref. Fig. 403).
(13)Connect hydraulic pump 2C6983 to the inlet fitting on the multiple connector and apply pressure to support the weight of the reverser half.
(14)Remove lifting sling and sling attachment fittings.
WARNING : DO NOT STAND BETWEEN REVERSER HALVES DURING OPENING OR CLOSING. SEVERE INJURY COULD RESULT IN ANY SUDDEN CLOSURE.
(15)Relieve pressure on the hydraulic pump and slowly lower reverser half until the hold-open rod can be installed.
(16)With the hold-open rod in place, apply clay or equivalent to the upper and lower deflection limiter pads with a minimum thickness of 0.300 in. (7.6 mm) over the entire face of the deflection limiter pad.
(17)Use the hydraulic system to close the reverser half as follows :
WARNING : DO NOT STAND BETWEEN THE REVERSER HALVES WHEN YOU OPEN OR CLOSE THE REVERSER. SEVERE INJURY CAN RESULT IF THE REVERSER CLOSES SUDDENLY.
(a)If the right reverser half is being installed and the nacelle temperature sensor was removed, install the sensor (Ref. 75-41-01, P. Block 401).
(b)Apply pressure with hydraulic pump 2C6983 until the hold-open rod is unloaded.
(c)Disconnect and stow the hold open rod.
(d)Slowly relieve the pump pressure to let the reverser half close slowly.
1 Leave the pump connected to the multiple connector until it has been determined that the deflection limiters have the proper gap or have been shimmed to the proper gap.
(18)Latch the forward latch ring upper and lower latches, and the three main thrust reverser lower latches.
CAUTION : IF THE UPPER LATCH HOOK IS NOT FULLY ENGAGED WITH THE U-BOLT, DAMAGE TO THE THRUST REVERSER CAN OCCUR DURING THRUST REVERSER DEPLOYMENT.
(19)Do a visual check to make sure that the upper latch hook is fully engaged with the U-bolt.
(20)Adjust the forward latch ring and the three main latches (Ref. 71-13-08, P. Block 501).
(21)Remove hydraulic pump 2C6983 and install the quick-disconnect cap on the multiple connector.
(22)Do an adjustment of the thrust reverser (Ref. 71-13-03, P. Block 501).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close fan cowl doors (Ref. 71-13-00, P. Block 301) and remove safety clips and tags and close appropriate circuit breakers.
(3)Remove access platform.
(4)Perform functional test of thrust reverser (Ref. 78-31-00, P. Block 501).



BM5 71 13 03 4 LJMO - 01

Fan Reverser Deflector Patterns
Figure 407



LM10044-00-A

BM5 71 13 03 4 LMM0 00

Upper Latch Can Engagement
Figure 408

FAN THRUST REVERSER COWL - ADJUSTMENT/TEST

1. General

The fan reverser assembly consists of 2 halves. Both halves may be removed or installed without interfering with the basic engine installation. This procedure is written for removal/installation of the left-hand half with the right-hand half being opposite except where noted.

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C6983	Pump, Hydraulic - Power Opener
B. 97102A4241M000	Sling, Lift - Fan Reverser
C.	Circuit Breakers Safety Clips
D.	Access Platform
E.	Torque Wrench 12-1536 lbf.in. (0.13 - 17.36 m.daN)
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
R - 71-13-03, P. Block 401	Fan Thrust Reverser Cowl
- 71-13-08, P. Block 501	Fan Thrust Reverser Mounting Ring Latch Assembly
R - 75-41-01, P. Block 401	Nacelle Temperature Sensor
- 78-31-00, P. Block 501	Thrust Reverser System Control

3. Procedure

A. Job Set-Up

(1) Open, safety and tag the appropriate circuit breakers and open the fan cowl and thrust reverser doors (Ref. 71-13-00, P. Block 301).

CAUTION : THE FAN COWL DOOR MUST BE OPEN PRIOR TO REMOVING THE REVERSER HALF.

(2) Install access platform.

(3) Open the blowout and access doors.

B. Adjustment

(1) Adjust the fan reverser latches (Ref. 71-13-08, P. Block 501).

R (2) Open the fan reverser (Ref. 71-13-00, P. Block 301).

R (3) Check deflection limiters to ensure that they mate with their corresponding pads by measuring the thickness of clay or equivalent previously installed in 71-13-03, P. Block 401, step 3.C. (10). Measured gaps should be as follows :

(a) On the upper deflection limiters, the gap should be 0.00-0.188 in. (0.0-4.77 mm). Deflection limiter pad faces must be parallel (fall along the same butt line) within 0.00 ± 0.030 in. (0.0 ± 0.76 mm). Shim as required.

(b) On the lower deflection limiters, the gap should be 0.00-0.250 in. (0.0-6.35 mm). Deflection limiter pad faces must be parallel (fall along the same butt line) within 0.0 ± 0.030 in. (0.0 ± 0.76 mm). Shim as required.

NOTE : If shims are required where bumper tubes are used, the shim thickness should be equally divided between the left and right hand reverser half. (Example : 0.030 in. (0.76 mm) thick shim required, 0.015 in. (0.38 mm) under the right and 0.015 in. (0.38 mm) under the left deflection limiter).

(4)If the right-hand reverser half is being installed and the nacelle temperature sensor was previously removed, install sensor (Ref. 75-41-01, P. Block 401).

WARNING : DO NOT STAND BETWEEN REVERSER HALVES DURING OPENING OR CLOSING. SEVERE INJURY COULD RESULT IN ANY SUDDEN CLOSURE.

(5)Using the hydraulic pump 2C6983, close the reverser half as follows:

(a)Apply pressure until the hold-open rod is unloaded.

(b)Disconnect and stow hold-open rod.

(c)Relieve pressure and slowly allow the reverser half to close.

(d)Latch forward latch ring (upper and lower latches) and the three main lower latches.

(e)Remove hydraulic pump 2C6983 and replace quick-disconnect cap on the multiple connector.

(6)Measure the latch closing force at the forward latch ring assembly upper and lower latches, and adjust the latches again, if necessary.

NOTE : The correct latch closing force for the upper latch handle is
R between 25 and 75 lbf. (11.12 and 33.36 daN). The correct latch closing force for the lower latch handle is between 25 and 75 lbf. (11.12 and 33.36 daN).

(7)Measure the latch closing force at the three lower bifurcation latches, and adjust the latches again, if necessary.

NOTE : The correct latch closing force for the three lower bifurcation latches is between 25 and 75 lbf. (11.12 and 33.36 daN).

(8)Close access panel doors.

CAUTION : MAKE SURE ACCESS PANEL DOORS ARE CLOSED AND PROPERLY LATCHED BEFORE CLOSING BLOWOUT DOOR. WITH DOORS CLOSED, MAKE SURE DOOR RETENTION PINS ARE ENGAGED.

(9)Close blowout door.

CAUTION : PRELOAD MUST NOT EXIST ON BLOWOUT DOOR LATCHES WITH DOOR CLOSED AND BLOWOUT DOOR RETENTION CABLES MUST BE PROPERLY STOWED TO AVOID DOOR PRELOAD OR INTERFERENCE.

(10)Check blowout door latch overlap on support assembly. Overlap must be more than 0.40 in. (10.16 mm). If overlap is not within limits, install shims as required between the door hinge assembly and the support.

(11)Install hinge access cover. TORQUE attaching screws to between 24 and 27 lbf.in. (0.27 and 0.31 m.daN).

**ON A/C 001-100,

(12)Connect throttle feedback cable to the center drive unit as follows: (Ref. Fig. 502)

(a)Insert throttle feedback cable on center drive unit, tighten nut at the upper part of CDU and wirelock.

(b)Install washer, nut and cotter pin.

(13)Connect directional control crossover flex line to upper firewall bulkhead fitting (Ref. Fig. 501).
TORQUE B-nut fitting to between 135 and 150 lbf.in. (1.53 and 1.69 m.daN).

(14)Connect air supply line to upper firewall bulkhead fitting (Ref. Fig. 501). TORQUE B-nut fitting to between 1340 and 1536 lbf.in. (15.1 and 17.3 m.daN).

(15)Connect aircraft electrical harness to reverser harness at the bracket on the upper firewall bulkhead. Tighten connector hand-tight and using soft-jawed pliers, tighten further, a maximum of 20 degrees.

(16)Connect the TLOD air supply line to the upper firewall bulkhead fitting (Ref. Fig. 503). TORQUE the installation nut to between 262 and 308 lbf.in. (2.96 and 3.48 m.daN).

(17)Connect the TLOD electrical connector from the upper firewall bulkhead (Ref. Fig. 503).

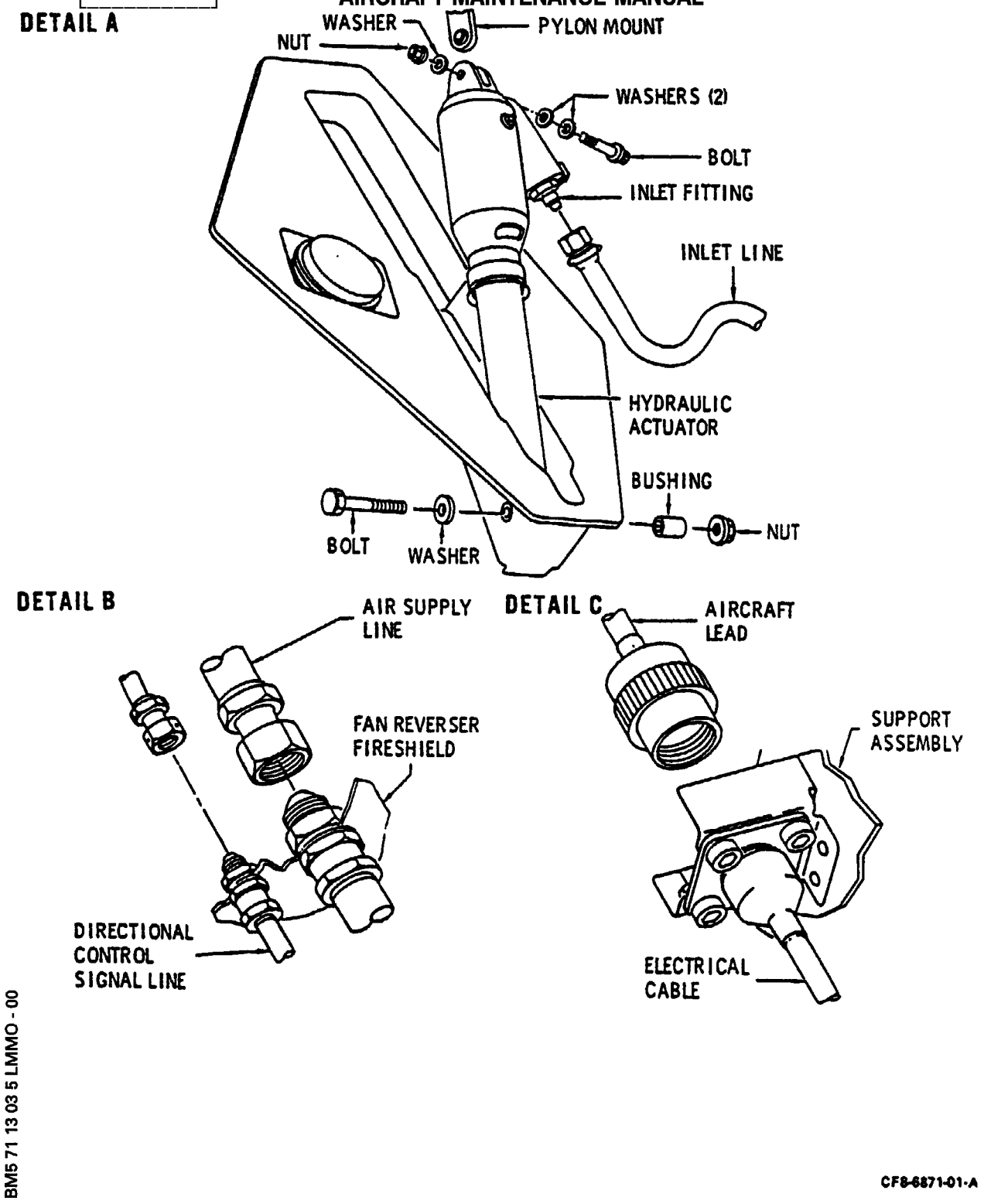
C. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

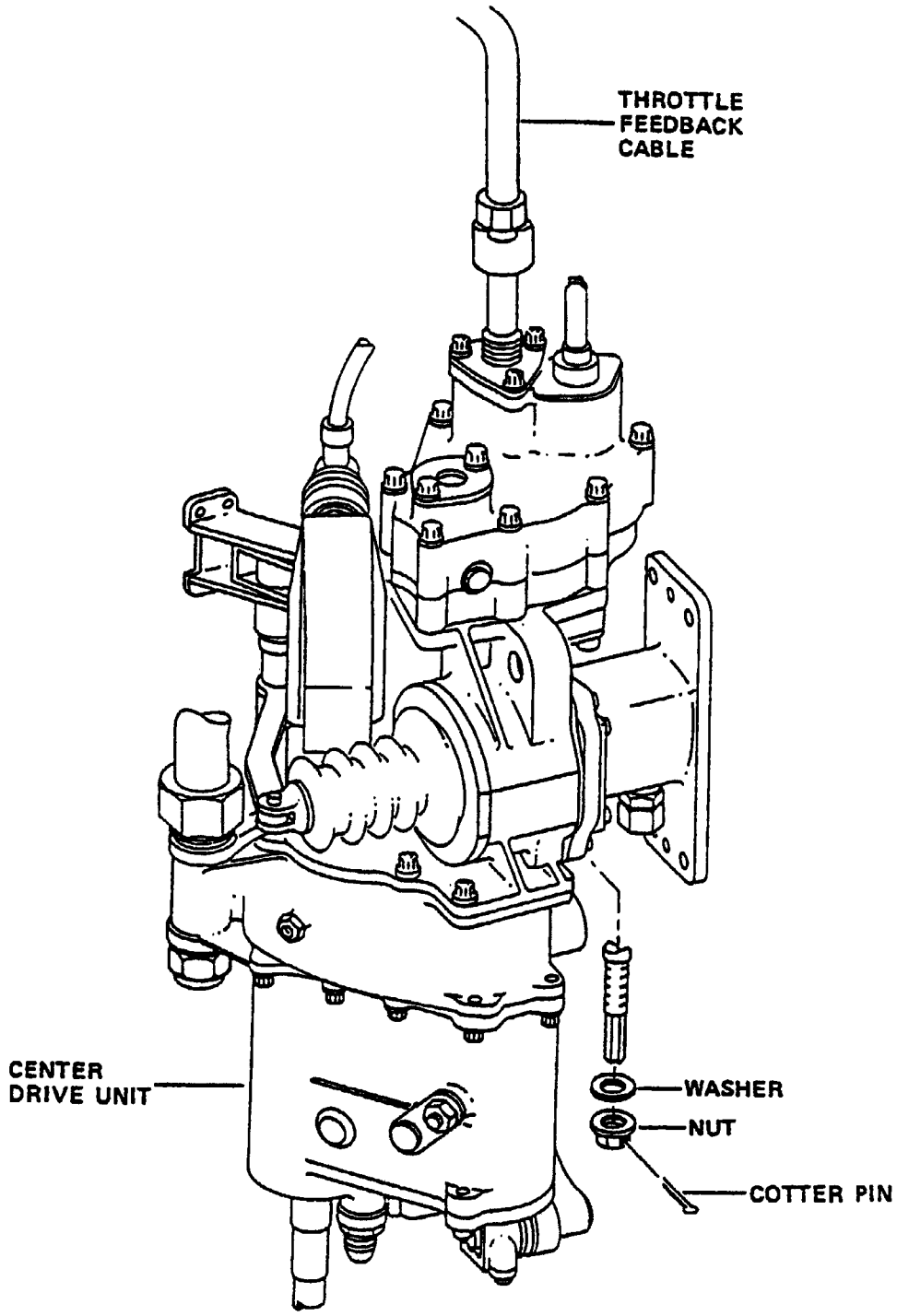
(2)Close fan cowl doors (Ref. 71-13-00, P. Block 301) and remove safety clips and tags and close appropriate circuit breakers.

(3)Remove access platform.

(4)Perform functional test of thrust reverser (Ref. 78-31-00, P. Block 501).

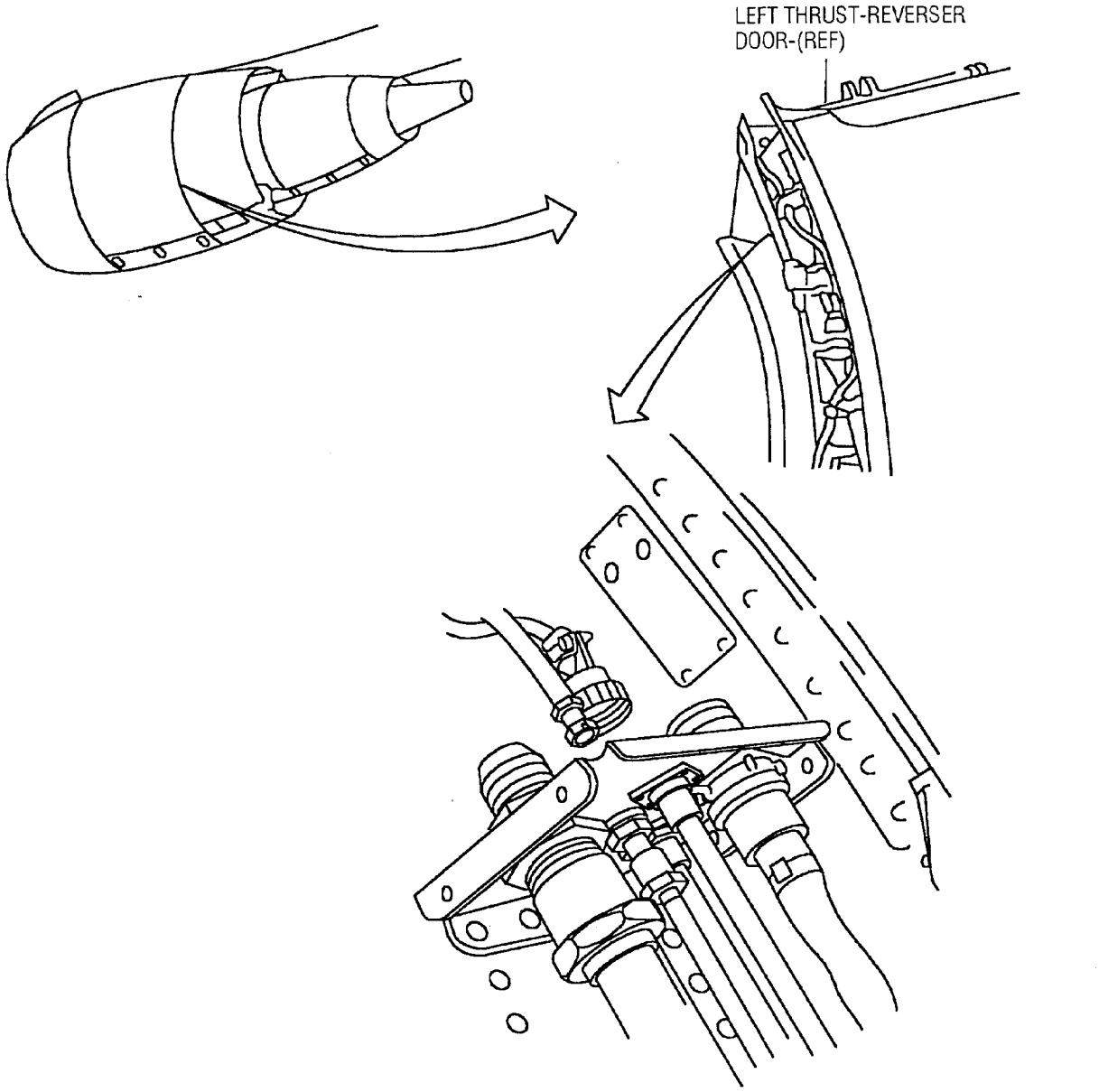


Fan Thrust Reverser Cowl
Figure 501



BM5 71 13 03 5 LPMO - 00

Throttle Feedback Cable Disconnection
Figure 502



BM5 71 13 03 5 LANO 00

TLOD Air Supply Line and Electrical Harness
Figure 503

R

FAN COWL DOOR HOLD-OPEN RODS - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of fan cowl door hold-open rods.

B. Access to hold-open rods is through the fan cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A. RSE1025	Fan Cowl Door Sling
B.	Circuit Breaker Safety Clips
C.	Torque Wrench 0-150 lbf. in. (0-1.7 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

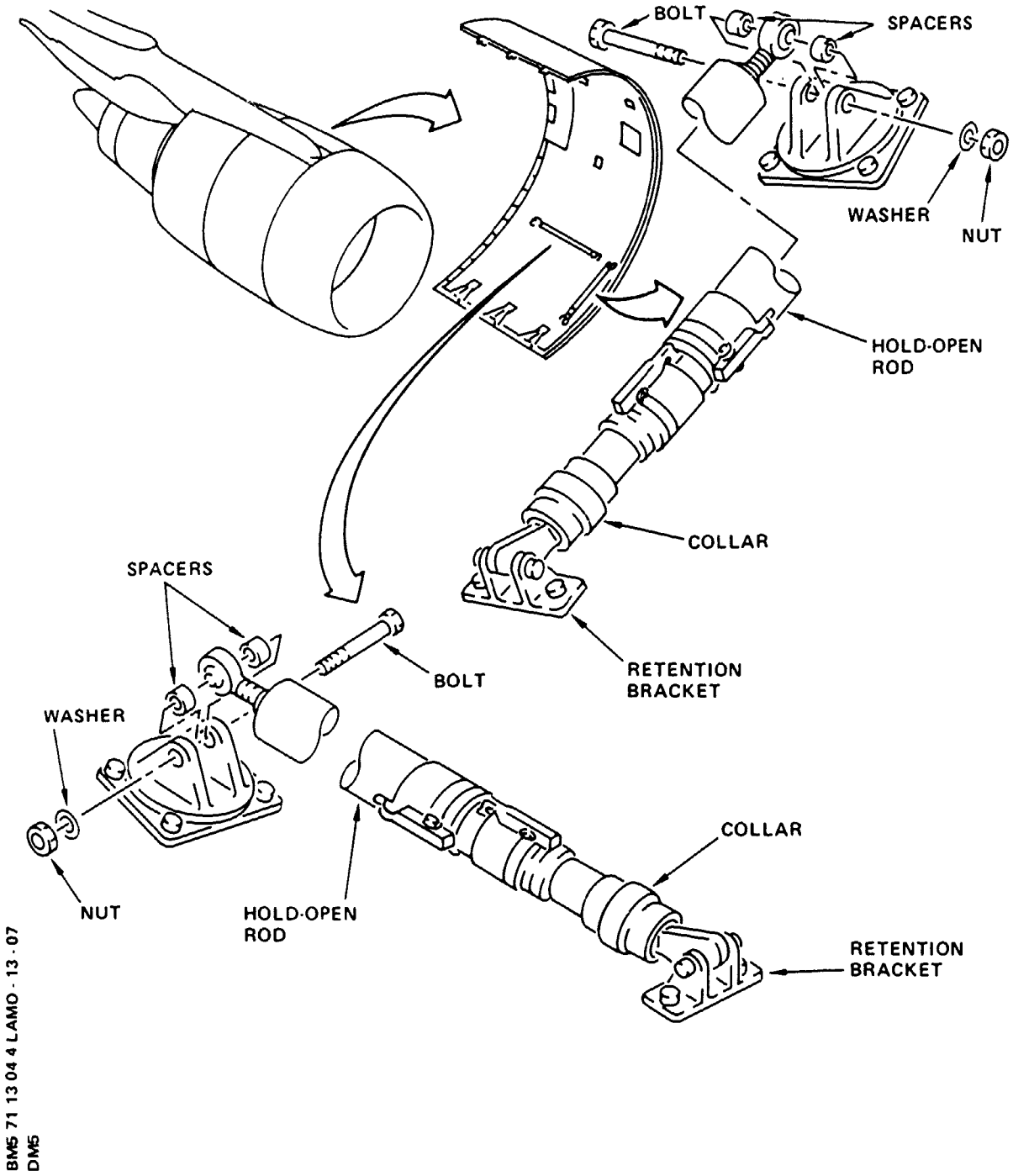
3. Procedure

A. Job Set-Up
(1)Open safety and tag the circuit breakers for the appropriate engine and open fan cowl doors (Ref. 71-13-00, P. Block 301).
(2)Remove hoist point filler plugs from fan cowl door and retain for reinstallation.
(3)Attach fan cowl sling, RSE1025, to fan cowl door hoist points.
(4)Hoist door, with suitable equipment, high enough to gain access to hold-open rods.

B. Removal (Ref. Fig. 401)
(1)Remove forward hold-open rod.
(a)Remove bolt, washer, nut and spacers attaching hold-open rod to fan cowl door.
(b)Pull collar down to release locking pin from retention bracket on door and remove rod.

C. Installation (Ref. Fig. 401)
(1)Attach hold-open rod to fan cowl door with bolt, spacers, washer and nut. TORQUE nut to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN).
(2)Push collar up to engage lower end of rod in retention bracket on door.

E. Close-Up
(1)Remove sling from fan cowl door.
(2)Install hoist point filler plugs in fan cowl door.
(3)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(4)Remove safety clips and tags and close circuit breakers, close fan cowl doors.



Fan Cowl Door Hold-Open Rods
Figure 401

FAN COWL DOOR LATCH - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the fan cowl door latches.

B. Access to the fan cowl door latches is through the fan cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Cotter Pin
B.	Circuit Breaker Safety Clips
C.	Push-Pull Gauge, DPPH-100
D.	Torque Wrench 200 - 1000 lbf.in. (2.26 - 11.30 m.daN)
E.	Torque Wrench 50 - 200 lbf.in. (0.56 - 2.26 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

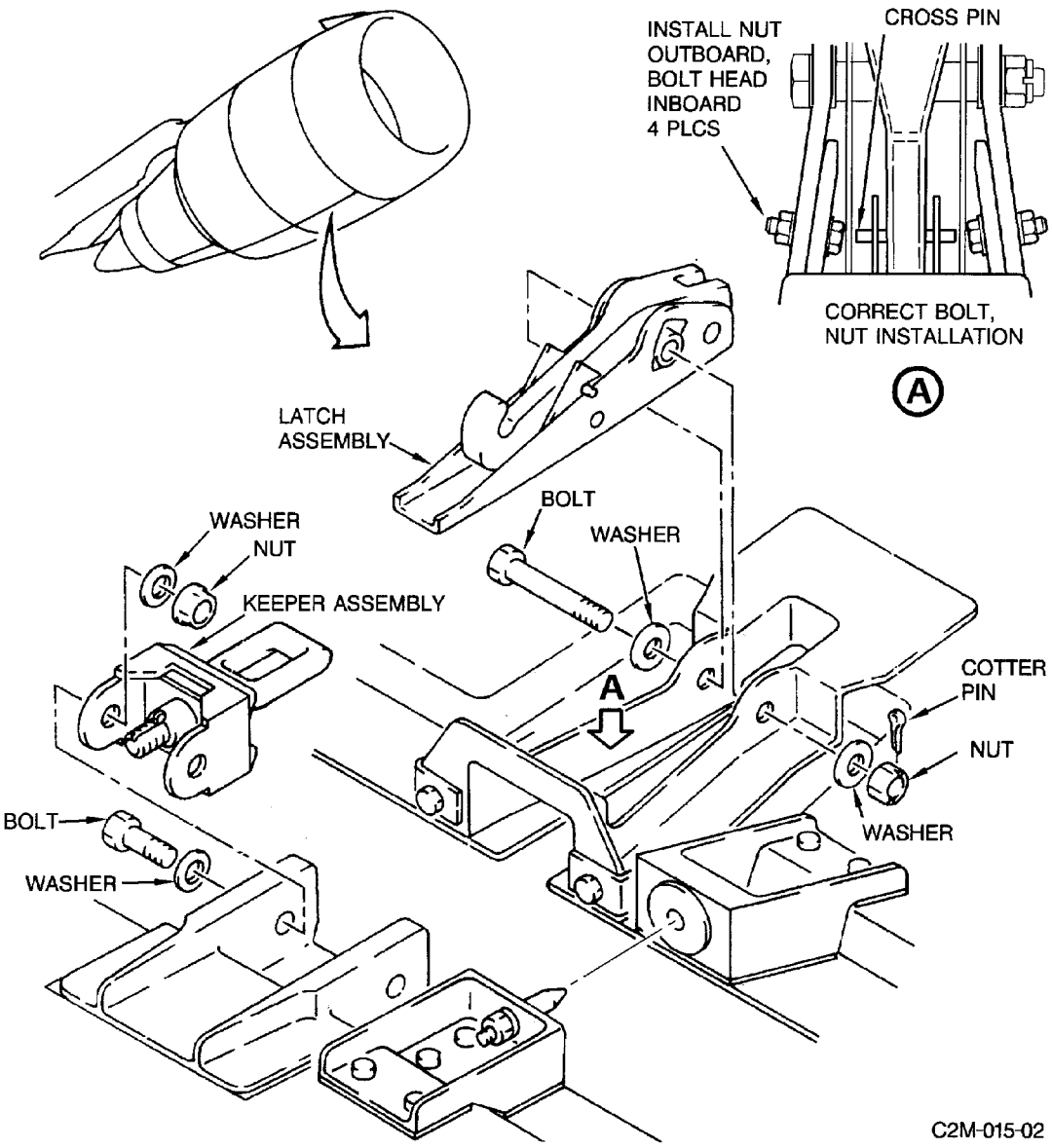
3. Procedure

A. Job Set-Up
Open, safety and tag the appropriate circuit breakers and open fan cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401)
(1)Remove bolt, washers, nut, and cotter pin attaching latch assembly to left fan cowl door and remove latch from door.
(2)Remove bolts, washers and nuts attaching clevis to right fan cowl door and remove clevis from door.

C. Installation (Ref. Fig. 401)
(1)Install latch assembly on left fan cowl door with bolt, washers and nut. **TORQUE** nut to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN) and install cotter pin.
NOTE : Install one washer under head of bolt and other washer under nut.
(2)Position clevis in right fan cowl door and install bolts, washers and nuts. **TORQUE** nuts to between 450 and 500 lbf. in. (5.08 and 5.65 m. daN.).

D. Adjustment (Ref. Fig. 402)
(1)Close fan cowl doors (Ref. 71-13-00, P. Block 301).
(2)Open cowl latch to be checked and ensure adjacent latches are engaged. Insert 5/32 in. (4 mm) wrench in hole on outside of door to adjust nut.
(3)Rotate adjusting nut until a force of 45 to 55 lbf. (20.01 to 24.46 daN) is required to close latch. Measure force at tip of latch with push-pull gauge.



BM5 71 13 05 4 LAMO 01

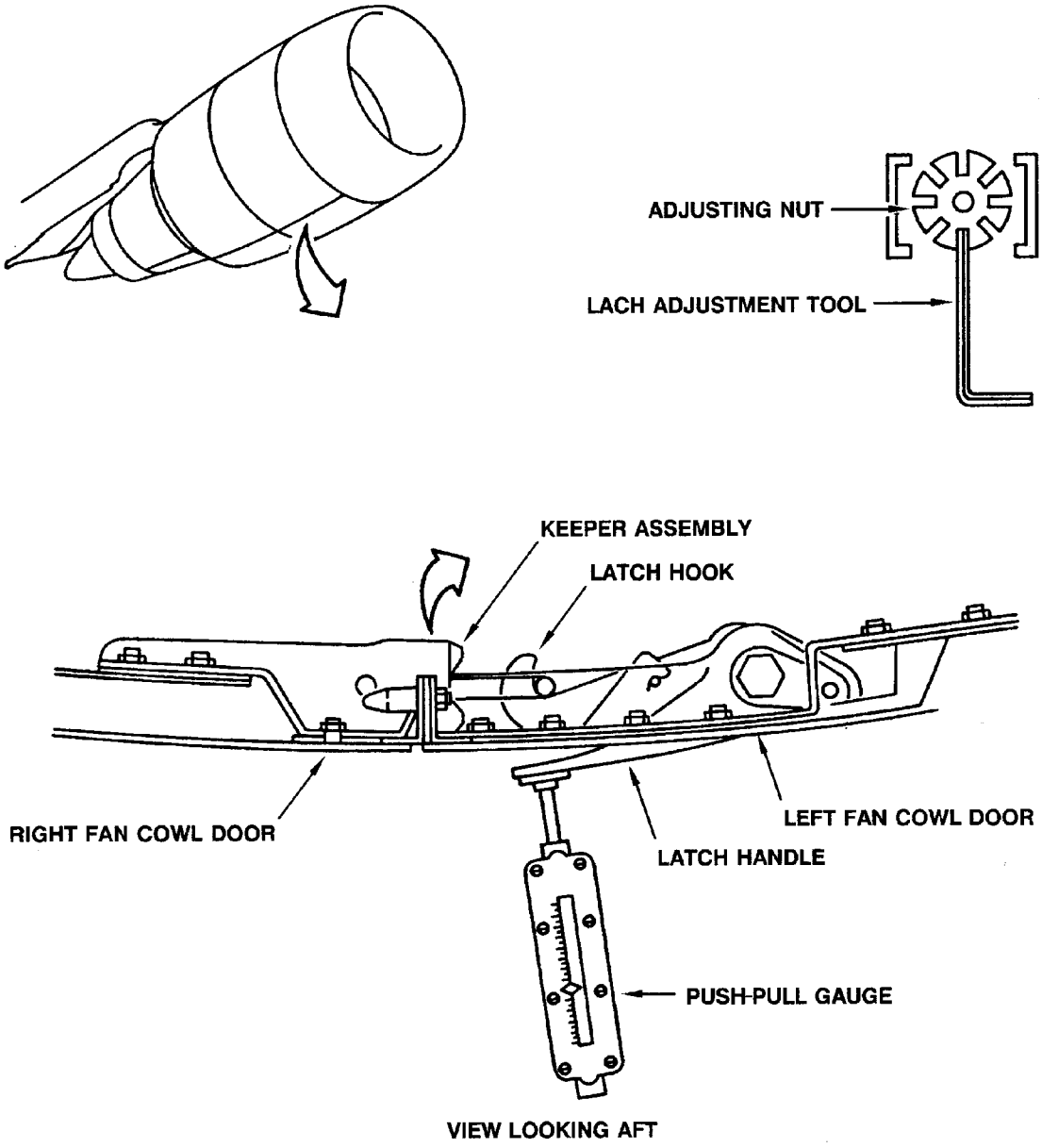
Fan Cowl Door Latch and Clevis
Figure 401

(4)Check tension of adjacent latches. Adjust, as necessary, to obtain a closing force of 45 to 55 lbf. (20.01 to 24.46 daN).

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment. Close all fan cowl door latches.

(2)Remove safety clips and tags and close circuit breakers (Ref. 71-13-00, P. Block 301).



BM5 71 13 05 4 LCM0 01

Fan Cowl Door Latches
Figure 402

FAN COWL DOOR LATCHES - INSPECTION/CHECK

1. General

A. This procedure gives the inspection and check instructions for the fan cowl door latch hook assemblies and keeper assemblies.

B. Access to the fan cowl door latches is through the fan cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C.	Warning Tags
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers.
(2)Safety precautions.
(a)Put a warning tag on the appropriate panel to tell any maintenance persons not to start the engine.
(b)Make sure the applicable engine (1 or 2) has been shut down for at least 5 minutes.
(c)Make sure the ENG MASTER switches (1 and 2) are in the OFF position.
(d)Put a warning tag on the appropriate panel and tell maintenance.
(3)Open fan cowl doors (Ref. 71-13-00, P. Block 301).
(4)Install access platform.

B. Visual Inspection/Check of the fan cowl door latch hook assemblies. (Ref. Fig. 601)
All damage that is not identified in this table must be repaired before the next flight.

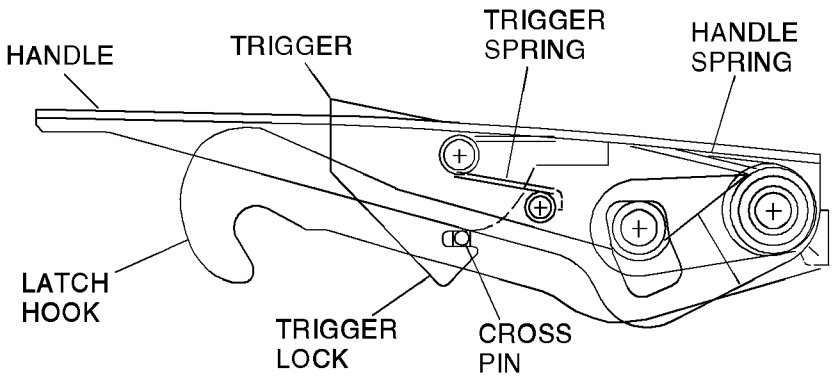
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Cross pin	Wear not through cadmium plate. Bent pins not allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(2) Trigger lock	No cracked, wear, or bent ears allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(3) Trigger spring	Spring must return trigger freely. No broken springs allowed.	If damage exceeds limits, replace the damaged latch hook assembly.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(4) Trigger	Trigger must move freely. Dents, bent, or cracked trigger not allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(5) Handle	No cracks or dents allowed. Must rotate freely.	If damage exceeds limits, replace the damaged latch hook assembly.
(6) Handle spring	Spring must return handle. No broken spring allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(7) Latch hook	Wear not through cadmium plate.	If damage exceeds limits, replace the damaged latch hook assembly.

C. Visual Inspection/Check of the fan cowl door keeper assemblies.
(Ref. Fig. 601)
All damage that is not identified in this table must be repaired before the next flight.

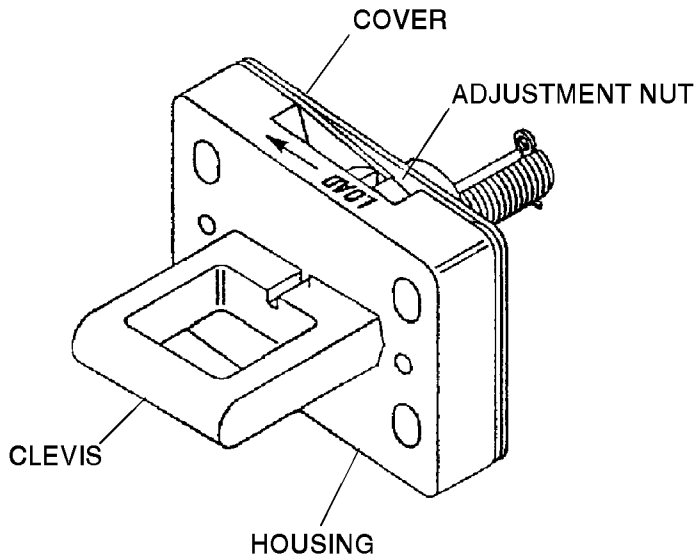
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Clevis	Wear not through cadmium plate. No cracks or bent bolts allowed.	If damage exceeds limits, replace the damaged keeper assembly.
(2) Adjustment nut	Must move freely. NOTE : After inspection, return the adjustment nut to its original position.	If damage exceeds limits, replace the damaged keeper assembly.
(3) Housing	No cracks or wear through cadmium plate allowed.	If damage exceeds limits, replace the damaged keeper assembly.
(4) Cover	No cracks or wear through cadmium plate allowed.	If damage exceeds limits, replace the damaged keeper assembly.

D. Close-Up
(1)Remove access platform.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close fan cowl doors (Ref. 71-13-00, P. Block. 301).



LATCH HOOK ASSEMBLY
(TYPICAL 3 PLACES)

A



KEEPER ASSEMBLY
(TYPICAL 3 PLACES)

B

A5AM-102-00

BM5 71 13 05 6 LAM0 00

Fan Cowl Door Latch and Keeper Assembly
Figure 601

(4)Remove safety clips and tags and close the appropriate circuit breakers.

CORE COWL DOOR LATCHES - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the core cowl door latches.

B. Access to the latches is through the core cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Push-Pull Gage (DPPH-100)
C.	Torque Wrench 50 - 100 lbf. in. (22.24 - 44.48 m.daN.)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

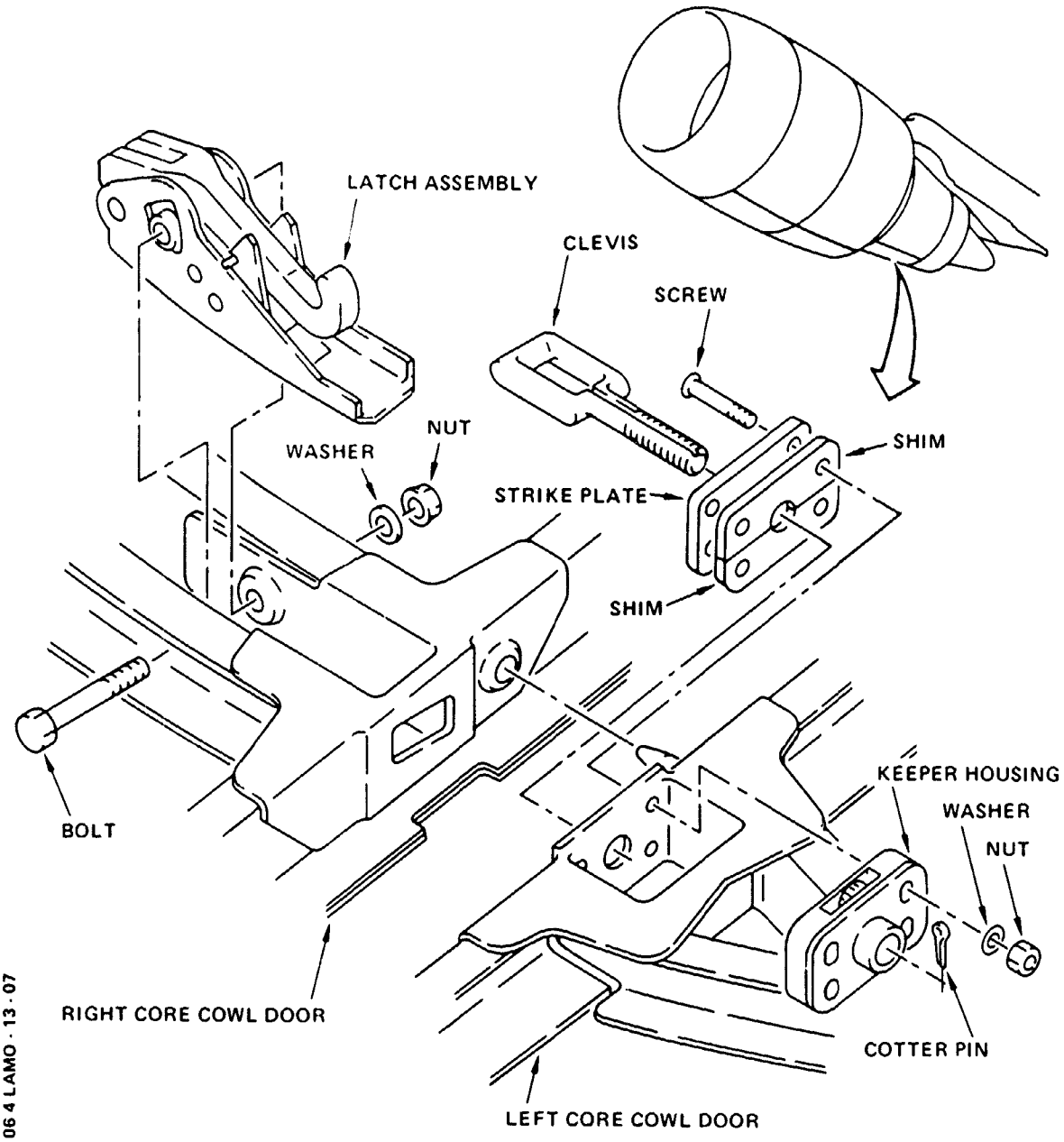
3. Procedure

A. Job Set-Up
(1)Open, safety and tag the appropriate circuit breakers and open core cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401)
(1)Remove bolt, washer and nut attaching latch assembly to right core cowl door and remove latch assembly from door.
(2)Remove clevis from left core cowl door.
(a)Remove cotter pin from clevis and insert hexagonal wrench into holes in clevis adjusting nut and rotate clockwise until clevis can be removed from clevis housing.
(b)Remove screws, washers and nuts attaching clevis housing and shim to door.

C. Installation (Ref. Fig. 401)
(1)Position latch assembly on right core cowl door and install bolt, washer and nut attaching latch to door. TORQUE nuts to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN).
(2)Install clevis and shim on left core cowl door with screws, washers and nuts. TORQUE nuts to between 20 and 25 lbf. in. (0.23 and 0.28 m. daN.).
(3)Thread clevis into adjusting nut in clevis housing and install cotter pin in end.

D. Adjustment (Ref. Fig. 402)
(1)Close core cowl doors (Ref. 71-13-00, P. Block 301).
(2)Open cowl latch to be checked and ensure adjacent latches are engaged. Insert hexagonal wrench in holes in clevis adjusting nut on left core cowl door. Rotate adjusting nut in direction required to obtain proper latch tension.



Core Cowl Door Latches
Figure 401

NOTE : Forward movement of wrench increases latch tension.

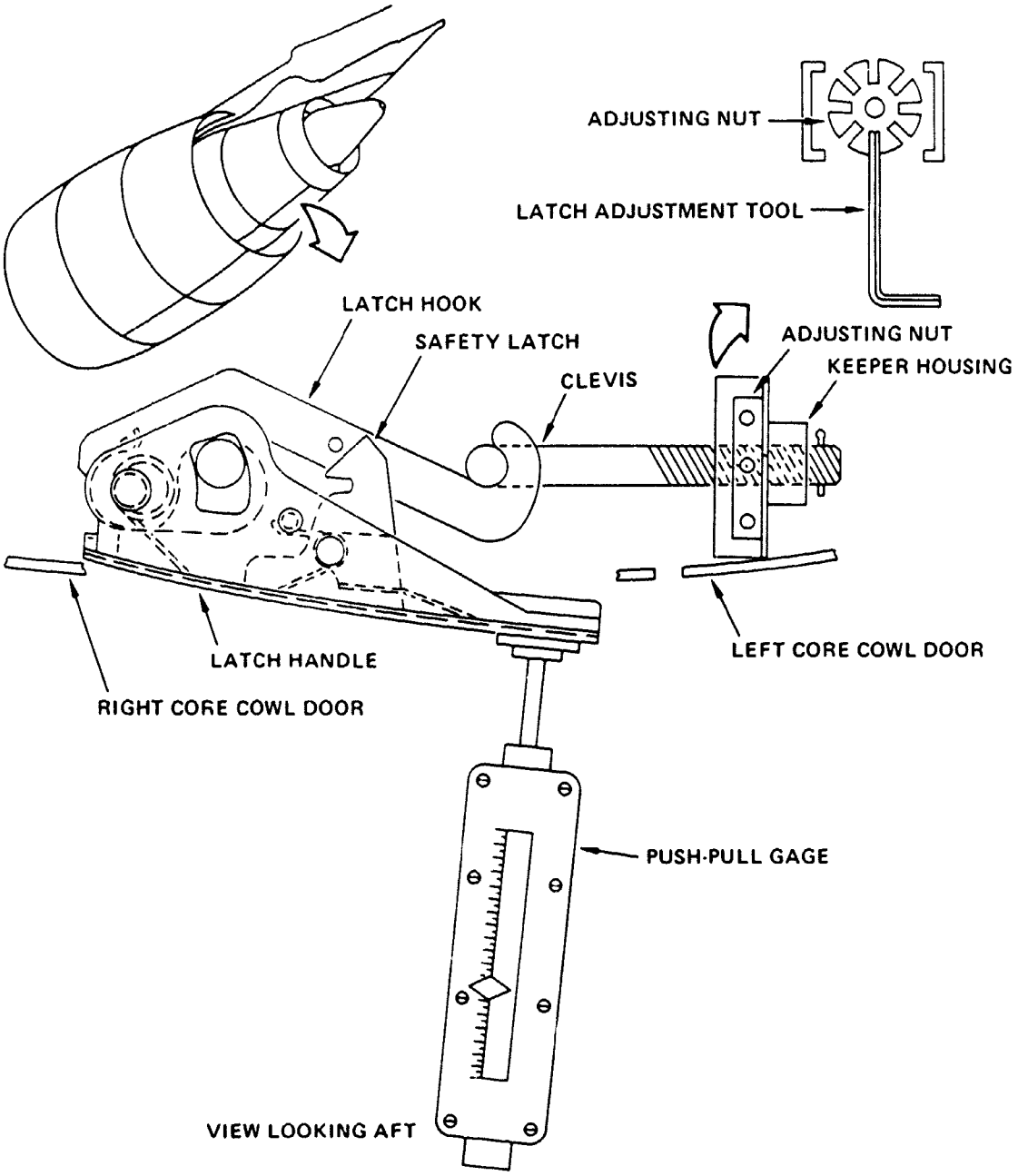
(3)Rotate adjusting nut until a force of 50 to 100 lbf. (22.24 to 44.48 daN) is required to close latch. Measure force at end of latch handle using push-pull gage.

(4)Check tension of all latches and adjust as necessary to obtain a closing force of 50 to 100 lbf. (22.24 to 44.48 daN).

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment. Close all core cowl latches.

(2)Remove safety clips and tags and close circuit breakers. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).



Core Cowl Door Latch Adjustment
Figure 402

CORE COWL DOOR LATCHES - INSPECTION/CHECK

1. General

A. This procedure gives the inspection and check instructions for the core cowl door latch hook assemblies and keeper assemblies.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C.	Warning Tags
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up
(1)Open, safety and tag the circuit breakers for the appropriate engine.
(2)Open cowl doors (Ref. 71-13-00, P. Block 301).
(3)Install access platform.

B. Visual Inspection/Check of the core cowl latch hook assemblies.
(Ref. Fig. 601)
All damage that is not identified in this table must be repaired before the next flight.

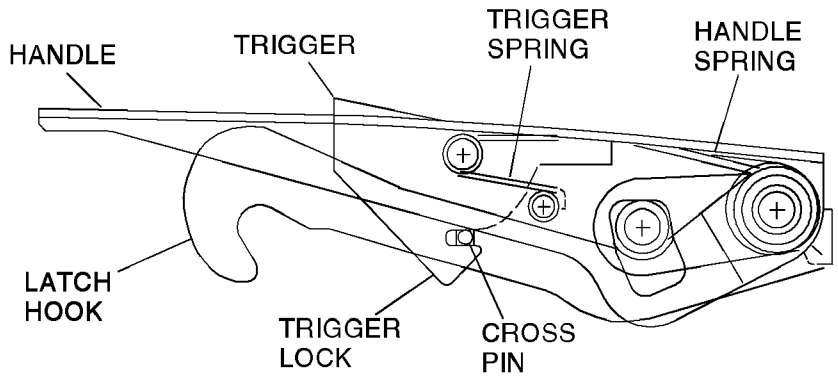
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Cross pin	Wear not through cadmium plate. Bent pins not allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(2) Trigger lock	No cracked, wear, or bent ears allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(3) Trigger spring	Spring must return trigger freely. No broken springs allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(4) Trigger	Trigger must move freely. Dents, bent, or cracked trigger not allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(5) Handle	No cracks or dents allowed. Must rotate freely.	If damage exceeds limits, replace the damaged latch hook assembly.

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(6) Handle spring	Spring must return handle. No broken spring allowed.	If damage exceeds limits, replace the damaged latch hook assembly.
(7) Latch hook	Wear not through cadmium plate.	If damage exceeds limits, replace the damaged latch hook assembly.

C. Visual Inspection/Check of the core cowl keeper assemblies.
(Ref. Fig. 601)
All damage that is not identified in this table must be repaired before the next flight.

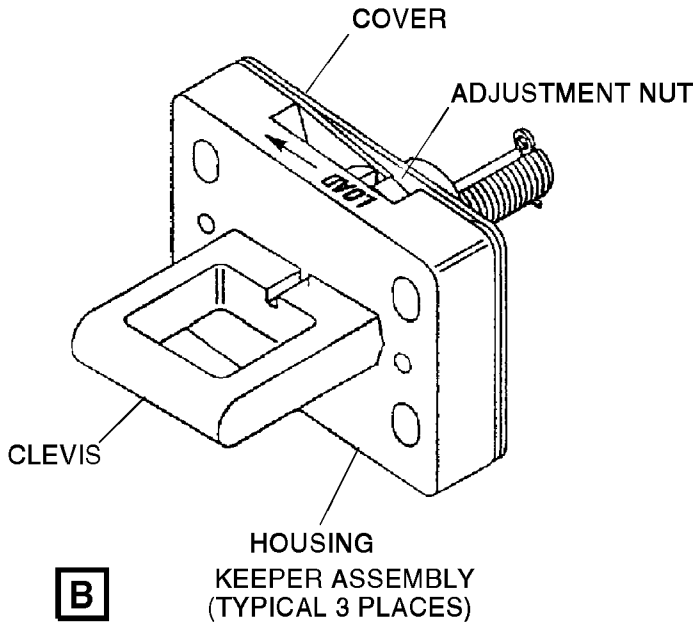
INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Clevis	Wear not through cadmium plate. No cracks or bent bolts allowed.	If damage exceeds limits, replace the damaged keeper assembly.
(2) Adjustment nut	Must move freely. NOTE : After inspection, return the adjustment nut to its original position.	If damage exceeds limits, replace the damaged keeper assembly.
(3) Housing	No cracks or wear through cadmium plate allowed.	If damage exceeds limits, replace the damaged keeper assembly.
(4) Cover	No cracks or wear through cadmium plate allowed.	If damage exceeds limits, replace the damaged keeper assembly.

D. Close-Up
(1)Remove access platform.
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Close core cowl doors (Ref. 71-13-00. P. Block. 301).
(4)Remove the safety clips and the tags, close the circuit breakers for the applicable engine.



LATCH HOOK ASSEMBLY
(TYPICAL 3 PLACES)

A



B

KEEPER ASSEMBLY
(TYPICAL 3 PLACES)

A5AM-103-00

BM5 71 13 06 6 LAM0 00

Core Cowl Latch and Keeper Assembly
Figure 601

CORE COWL DOOR HOLD-OPEN ROD - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of core cowl door hold-open rods.

B. Access to hold-open rods is through the core cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 0-150 lbf.in. (0-1.7 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

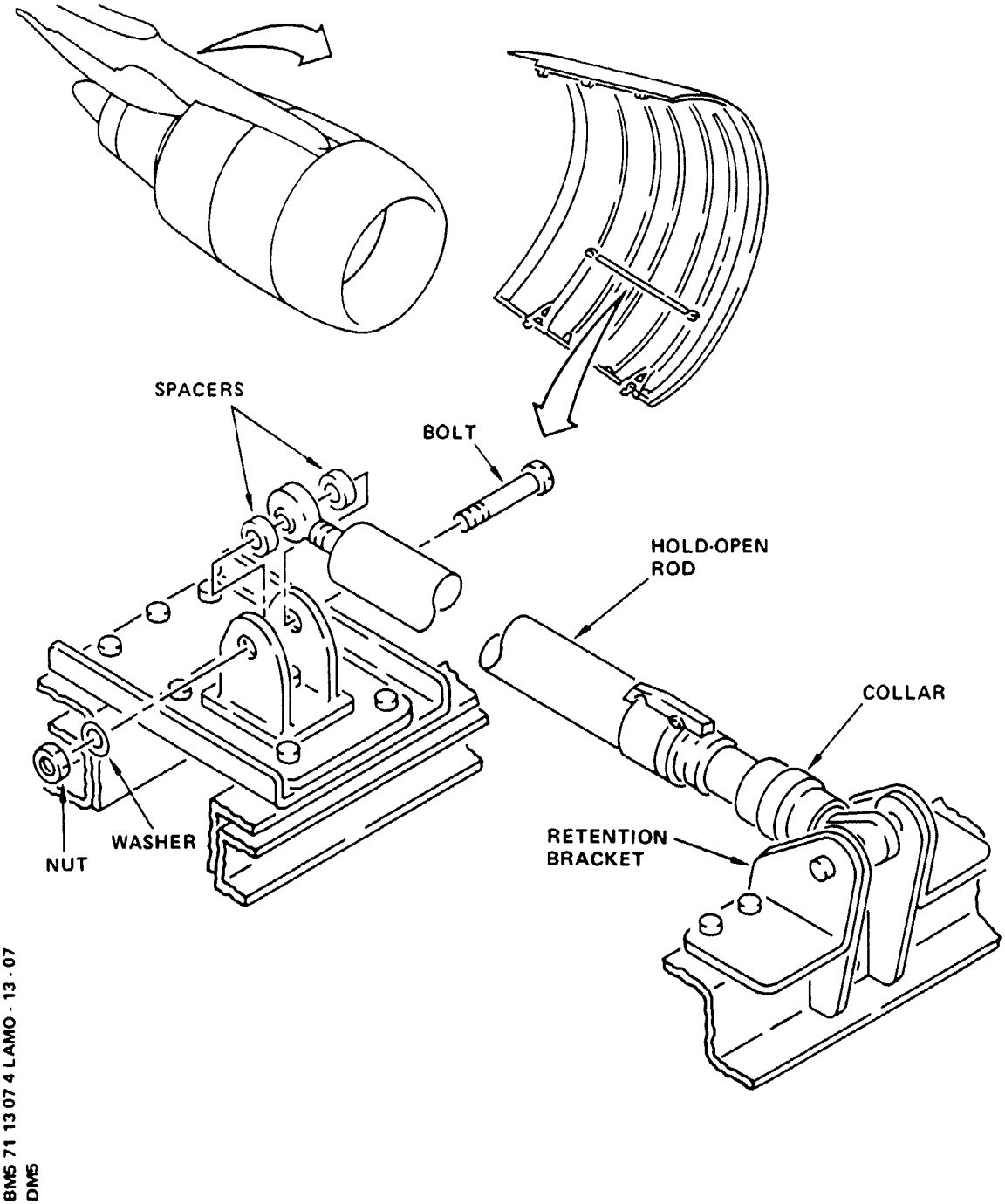
3. Procedure

A. Job Set-Up
(1) Open safety and tag the circuit breakers for the appropriate engine and open core cowl door (Ref. 71-13-00, P. Block 301).

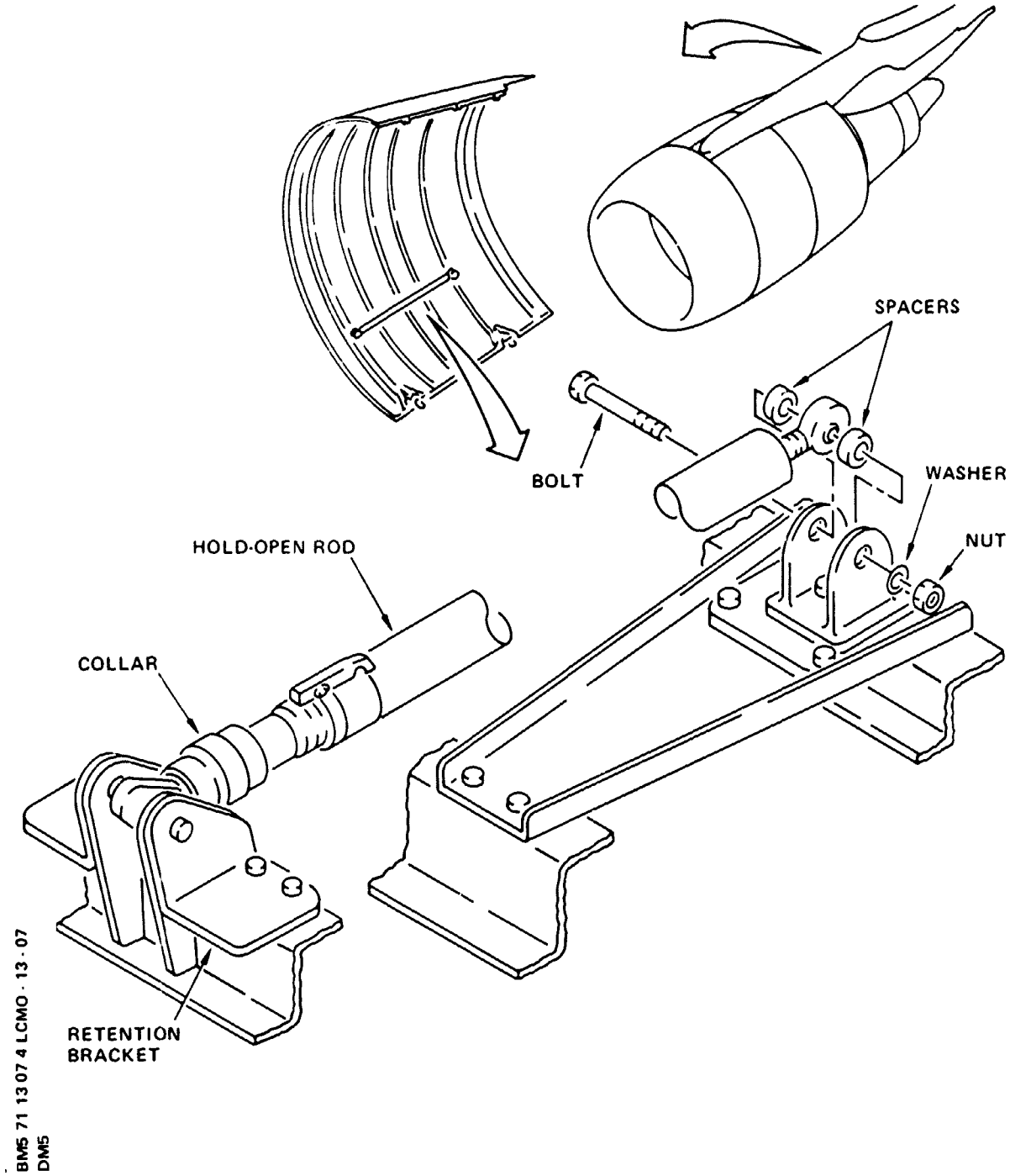
B. Removal (Ref. Fig. 401, 402)
(1) Hold core cowl door in open position with suitable device.
(2) Remove bolt, washer, nut and spacers attaching hold-open rod to core cowl.
(3) Pull collar down to release hold-open rod locking pin from retention bracket and remove rod from door.

C. Installation (Ref. Fig. 401, 402)
(1) Attach hold-open rod to core cowl door with bolt, spacers, washer and nut. TORQUE nut to between 100 and 140 lbf.in. (1.13 and 1.58 m.daN).
(2) Push collar up to engage lower end of rod in retention bracket on door.

D. Close-Up
(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2) Remove safety clips and tags and close circuit breakers for the appropriate engine, close core cowl doors (Ref. 71-13-00, P. Block 301).



Core Cowl Door Hold-Open Rod, Left
Figure 401



Core Cowl Door Hold-Open Rod, Right
Figure 402

FAN THRUST REVERSER MOUNTING RING LATCH ASSEMBLY - ADJUSTMENT/TEST

1. General

A. This procedure has the adjustment instructions for the thrust reverser mounting ring latch assembly.
(1)Adjustment of the latch ring is done with the reverser installed, the latch ring engaged in the engine V-groove, and all three lower bifurcation latches engaged and latched.

B. The mounting ring latch assembly is on the forward end of each thrust reverser half. It goes from the top to the bottom of each reverser half. There are two latches on the thrust reverser mounting ring latch assembly. The latches are at the 1-and 5-o'clock positions.

C. The upper latch of the mounting ring latch assembly is a hook that slips into a U-bolt bracket at the top of the fan case. The U-bolt is adjustable to control the upper latching force.

D. The lower latch is a barrel nut that fits into a clevis at the bottom of the fan case. The barrel nut is adjustable to control the lower latching force.

E. Each half of the mounting ring latch assembly is independent of the other half. To adjust all of the mounting ring latch assembly, you must do this task on each half of the mounting ring latch assembly.

F. To adjust the mounting ring latch assembly, you must do the steps that follow :
(1)Do a deactivation of the two thrust reverser halves.
(2)Open the upper and lower latches on the mounting ring latch assembly.
(3)If necessary, adjust the three thrust reverser lower bifurcation latches.
(4)Align the mounting ring latch assembly with the thrust reverser torque box.
(5)Make a measurement of the latch closing force.
(6)Make a measurement of the lower fireseal compression.
(7)Adjust the cable length of the mounting ring latch assembly, the upper latch, and the lower latch.
(8)Tighten the attachment bolts of the mounting ring latch assembly.
(9)Close the mounting ring latch assembly.
(10)Do an activation of the two thrust reverser halves.

2. Equipment and Materials

ITEM	DESIGNATION
A. 2C69983	Pump, Hydraulic
B.	Push-Pull Gage 0-100 lbf. (0-44.5 daN) in 1-lbf. (0.45-daN) Graduations
C.	Torque Wrench, 0-600 lbf.in. (0-6.78 m.daN)
D. MS 20995C32	Lockwire

ITEM	DESIGNATION
Referenced Procedures	
- 71-13-00, P. Block 301	Cowl Doors
- 78-31-00, P. Block 901	Thrust Reverser System
- 78-32-00, P. Block 601	Fan Reverser Assembly
- 78-32-00, P. Block 801	Fan Reverser Assembly

3. Procedure (Ref. Fig. 501)

A. Job Set-up

WARNING : MAKE SURE THAT YOU DO THE DEACTIVATION TASK FOR THE THRUST REVERSER HALF. IF YOU DO NOT DO THE DEACTIVATION, THE THRUST REVERSER COULD ACCIDENTALLY OPERATE.
ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

(1)Deactivate the thrust reverser for ground maintenance (Ref. 78-31-00, P. Block 901).

(2)Open the thrust reverser (Ref. 71-13-00, P. Block 301). Do a check for binding in the latch ring mechanism (Ref. 78-32-00, P. Block 601).

B. Adjustment

R Pre SB MRAS 78-1114

R (1)Loosen the two locknuts (A and B) on each side of the U-bolt (Ref. Fig. 502).

R End Pre SB MRAS 78-1114

R Post SB MRAS 78-1114

R (1)Loosen the non-locking nuts A and the locknuts B on each side of the U-bolt (Ref. Fig. 502).

R End Post SB MRAS 78-1114

(2)Adjust the U-bolt so that the clearance between the U-bolt and the flange is 0.84-1.00 in. (21.3-25.4 mm).

WARNING : DO NOT LOOSEN THE FOUR BOLTS THAT HOLD THE HOLD OPEN ROD SUPPORT BRACKET TO THE TORQUE BOX FORWARD FRAME. TO DO SO CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE EQUIPMENT.

(3)Make sure that the latch ring can move. If the latch ring cannot move, loosen the bolts that attach it to the thrust reverser forward flange (Ref. Fig. 502).

(4)Close the thrust reverser (Ref. 71-13-00, P. Block 301). Close the three lower bifurcation latches.

WARNING : DO NOT USE THE HOLD OPEN ROD WHEN THESES FOUR BOLTS ARE LOOSE. TO DO SO CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE EQUIPMENT.

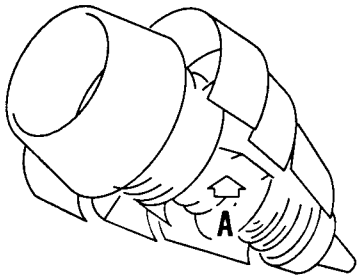
(5)Loosen the four latch ring bolts that attach the hold open rod support bracket to the thrust reverser forward frame.

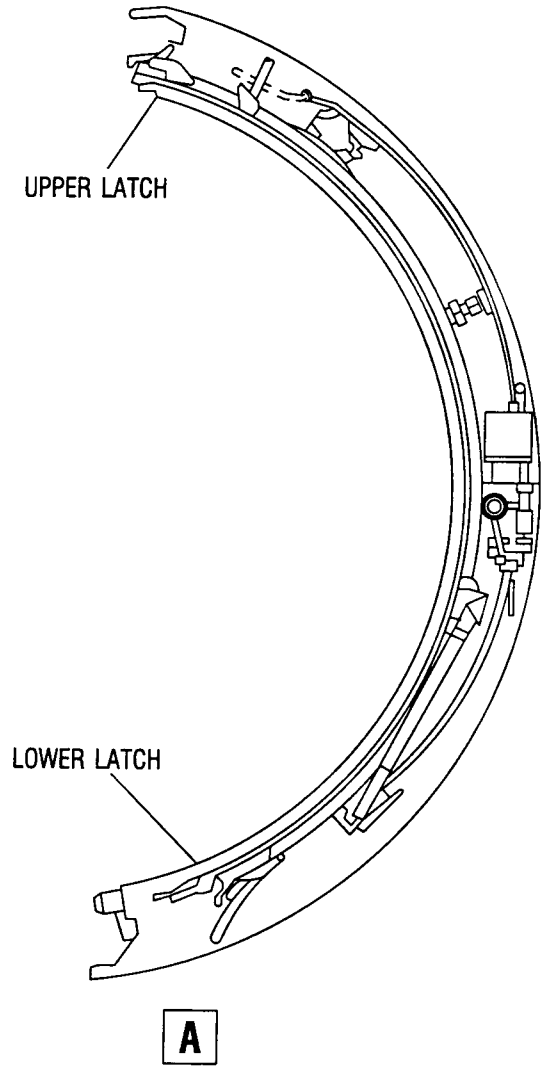
(6)Close the three thrust reverser lower bifurcation latches. Make sure that the thrust reverser halves are fully seated against each other (Ref. Fig. 503).

NOTE : If necessary, you can close the latch ring lower forward latch first, to make it easier to close the three lower latches.

(a)Close the forward latch first.

(b)Close the middle latch second.
(c)Close the aft latch last.
(7)Open the three thrust reverser lower bifurcation latches. Make sure that the thrust reverser halves stay seated against each other.
(8)Make a measurement of the closing force of each lower bifurcation latch, and adjust if necessary. Close and adjust each latch, one at a time. Adjust the forward latch first, the middle latch second, and the aft latch last (Ref. Fig. 503).
(a)Examine the thrust reverser lower latches for damage (Ref. 78-32-00, P. Block 601).
1 Replace the thrust reverser lower latches that are damaged or broken (Ref. 78-32-00, Page Block 801).
(b)Use a push-pull gage to make a measurement of the latch closing force at 0.5-2.5 in. (12.7-63.5 mm) from the end of the latch handle.
(c)If the latch closing force is not 25-75 lbf. (11.12-33.36 daN), do the adjustment procedure that follows. If the latch closing force is within the limits, go to step (9). Adjust the forward latch first, the middle latch second, and the aft latch last.
NOTE : It may be necessary to remove the latch covers and fire blankets to get access to the latch bolt and offset bushing.
1 Loosen the latch bolt.
2 Loosen the four bolts to disengage the two bushing stops.
3 Turn the two (octagonal shape) offset bushings to move the axis of the latch bolt.
NOTE : This will adjust the position of the latch hook relative to the anchor bolt on the opposite thrust reverser.
- You must turn the two bushings in the same direction and by the same amount.
4 Engage the lower latch hook on the anchor bolt.
5 Close the lower latch handle and make a measurement of the force that is necessary to close the latch handle.
- Use a push-pull gage to make a measurement of the force approximately 0.5-2.5 in. (12.7-63.5 mm) from the end of the latch handle.
- If the force is not 25-75 lbf. (11.12-33.36 daN), you must adjust the offset bushings again until the force is correct.
- If you cannot adjust the offset bushing to get the necessary force, do the steps that follow.
. Install laminated shims under the lower latch wear pad.
NOTE : The maximum permitted thickness for all the shims is 0.032 in. (0.81 mm) at each wear pad.
. Do the steps again to turn the offset bushing and measure the lower latch closing force. Refer to steps (8)(c)3 through (8)(c)5.
6 Tighten the latch bolt of the latch you adjusted. TORQUE the forward and middle latch bolts to between 300 and 360 lbf.in. (3.39 and 4.07 m.daN). TORQUE the aft latch bolt to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN).
7 Engage the bushing stops and tighten the bolts for the stops.
8 Open the lower latch that you adjusted.
9 Do steps (8)(c)1 through (8)(c)8 again for the remaining latches.
10 If applicable, install the fire blankets and the latch covers.

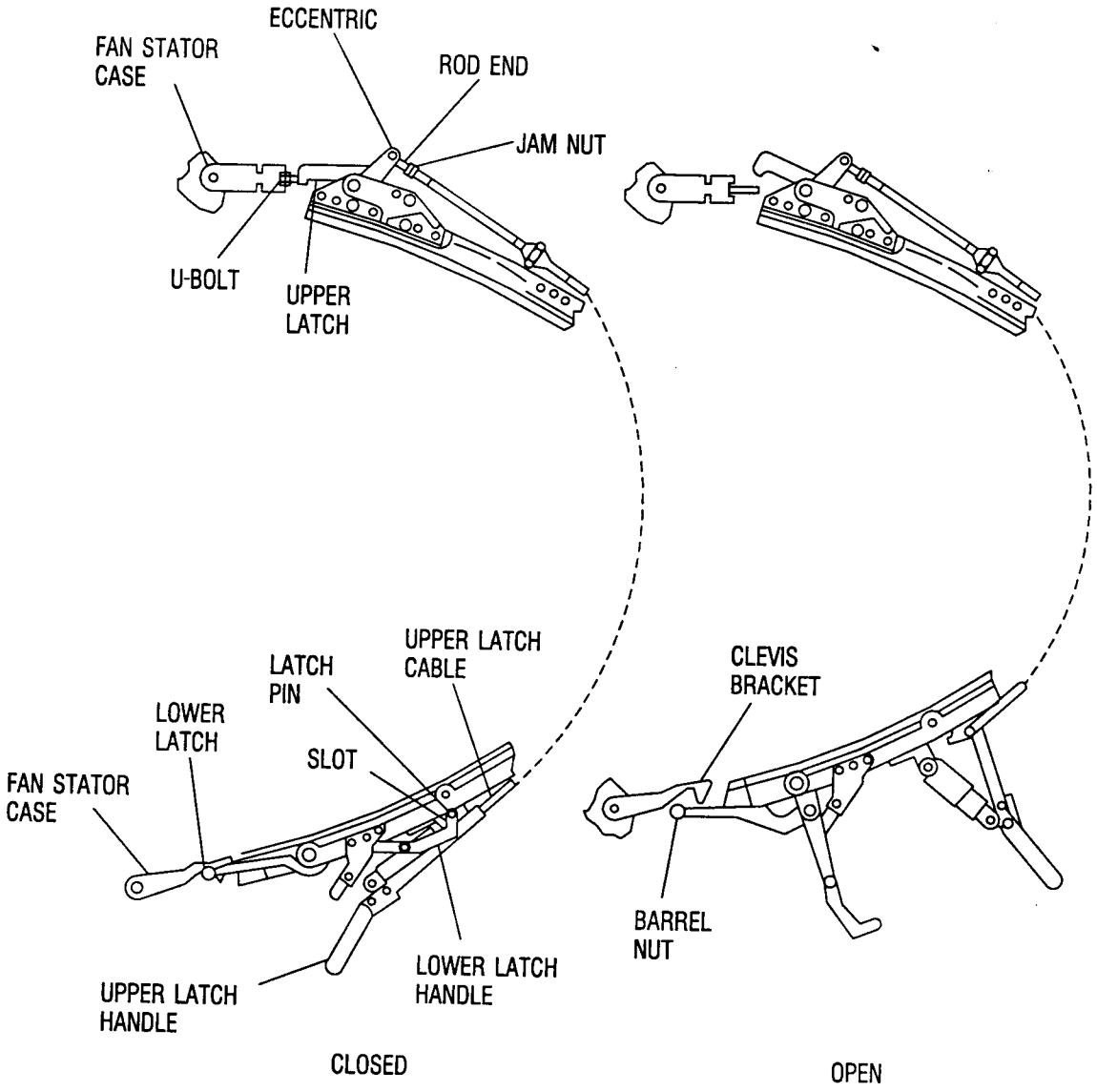




LM10034-00-A

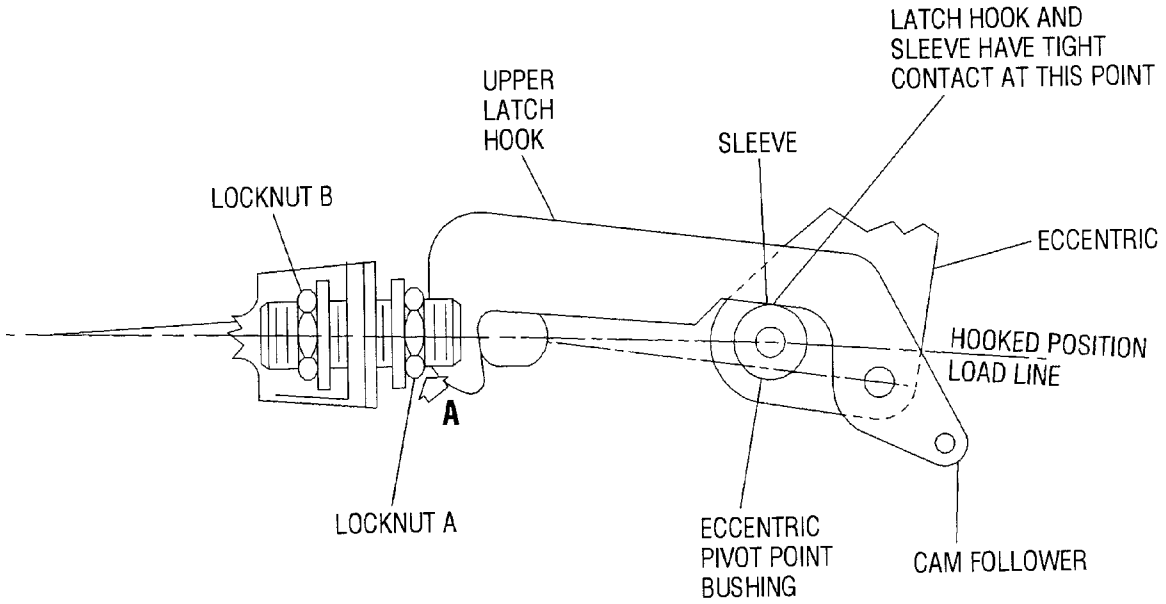
BM5 71 13 08 5 LAMA 00

Thrust Reverser Mounting Ring Latch Assembly (Sheet 1/2)
Figure 501



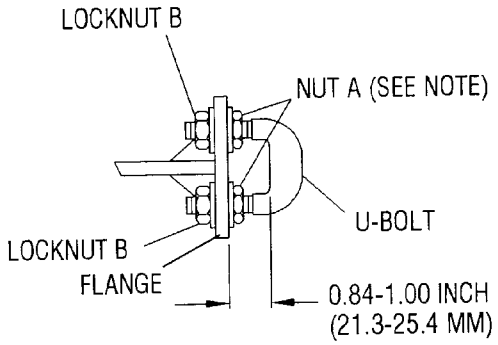
BM5 71 13 08 5 LAMB 00

Thrust Reverser Mounting Ring Latch Assembly (Sheet 2/2)
Figure 501



UPPER LATCH CAM
OMITTED FOR CLARITY

NOTE:
PRE SB MRAS 78-1114
ENGINES USE
LOCKNUTS
AT LOCATION A.
POST SB MRAS 78-1114
ENGINES USE
NON-LOCKING
NUTS AT LOCATION A.



U-BOLT ADJUSTMENT

A

LM10036-02-A

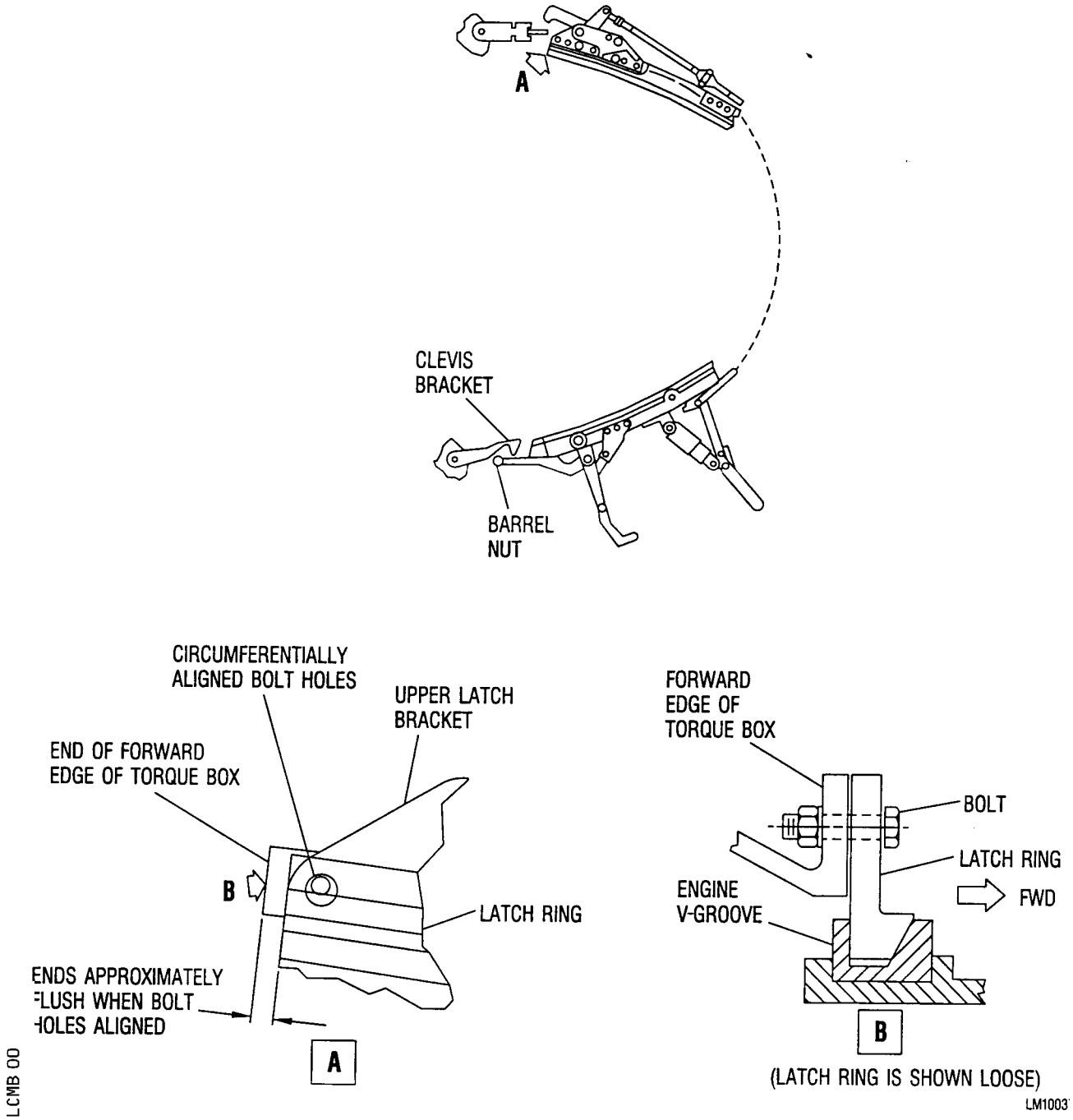
BM5 71 13 08 5 LCMA 01

Thrust Reverser Mounting Ring Latch Assembly
Adjustments (Sheet 1/2)
Figure 502

R

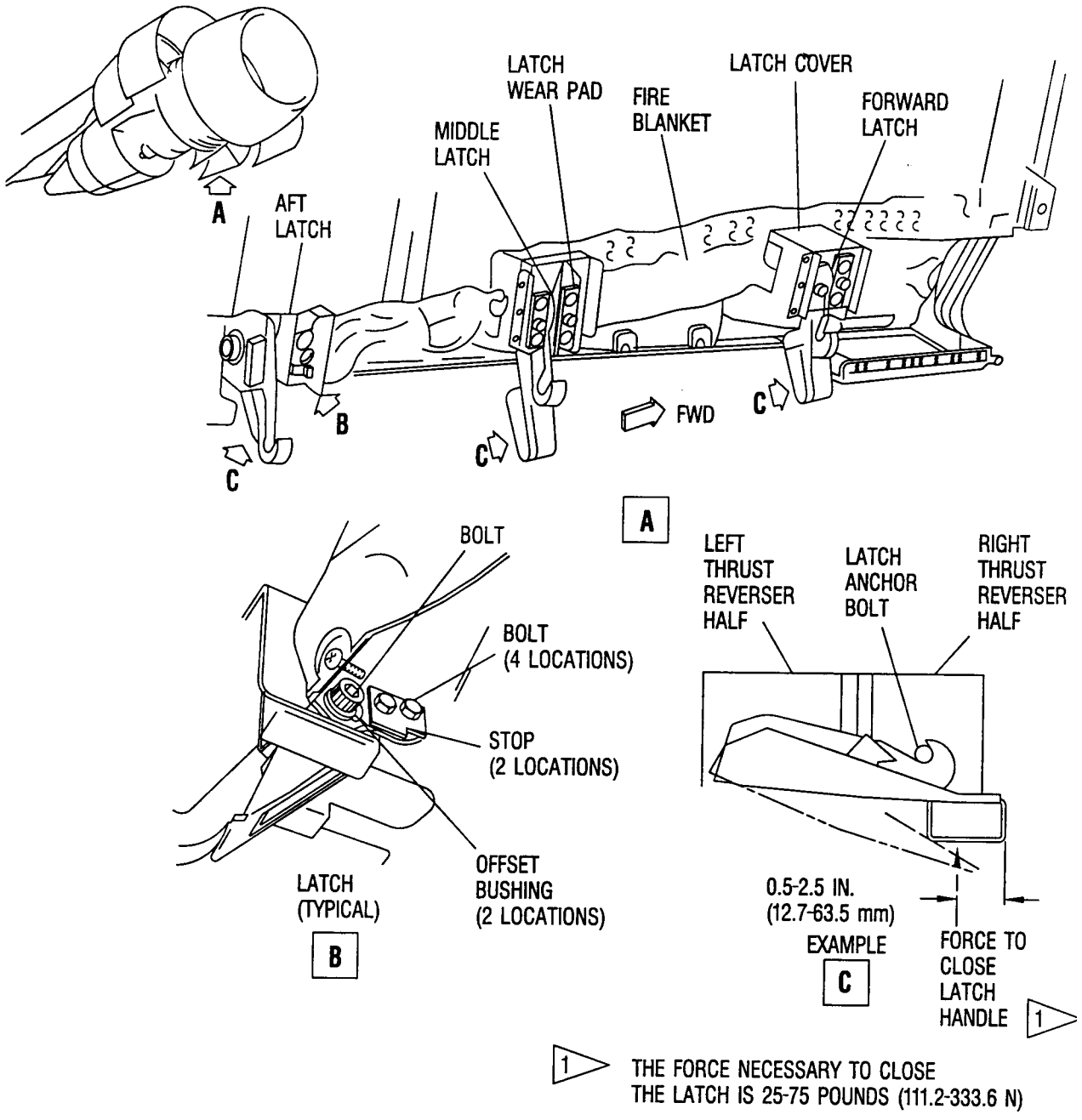
R EFFECTIVITY: 001-100,

PIA



BM5 71 13 08 5 LCMB 00

Thrust Reverser Mounting Ring Latch Assembly
Adjustments (Sheet 2/2)
Figure 502



BM5 71 13 08 5 LEMO 00

Thrust Reverser Lower Bifurcation Latch Adjustment
Figure 503

(9)Open the thrust reverser approximately 6.0-12.0 in. (152.4-304.8 mm) (Ref. 71-13-00, P. Block 301).
(10)Align the holes in the latch ring with the holes in the torque box to allow for maximum circumferential displacement in either direction. This can be approximated by aligning the upper end of the latch ring with the end of the torque box.
(11)TORQUE the top bolt through the torque box and the latch ring to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN).
(12)Close the thrust reverser (Ref. 71-13-00, P. Block 301). Close the three lower latches.
NOTE : If necessary, you can close the latch ring lower forward latch first, to make it easier to close the three lower latches.
(a)Close the forward latch first.
(b)Close the middle latch second.
(c)Close the aft latch last.
(13)Use a rubber mallet and a soft drift to tap the latch ring into the engine V-groove. Start at the top and work toward the bottom.
(14)Adjust the closing force of the lower latch handle (Ref. Fig. 504).
(a)Back off the lower latch handle barrel nut until the lower latch handle closing force is approximately 0.0 lbf. (0.0 daN).
(b)Engage the barrel nut with the mating clevis. With a push-pull gage, make a measurement of the closing force of the lower latch handle.
1 Make the measurement of the latch closing force 1.0 in. (25.4 mm) from the end of the latch handle.
(c)Adjust the barrel nut until the force necessary to close the lower latch handle is 10-20 lbf. (4.45-8.90 daN). Keep the lower latch engaged.
1 Make a measurement of the latch closing force at each half-turn increment of the barrel nut, until you get the correct closing force.
(15)Adjust the fireseal clearances (Ref. Fig. 505).
(a)Make sure that the lower bifurcation fire seal is compressed almost equally by the two thrust reverser halves. If gaps at specified locations are different by more than 0.25 in. (6.35 mm), do the steps that follow.
1 Decrease the load on the lower latch handle of the reverser half that has put too much pressure on the fireseal ; increase the load on the lower latch handle of the opposite reverser half.
- Adjust the barrel nuts on the two latch handles with equal and opposite numbers of half turns.
NOTE : One full turn of the barrel nut is approximately 0.04 in. (1.0 mm) of reverser half displacement.
- Open and close the reverser halves between adjustments to get the seals in the correct positions.
2 Make adjustments to the barrel nut as necessary until the gaps show moderate compression on each fireseal, and the lower latch handle loads are 10-40 lbf. (4.45-17.80 daN).
(16)Open and close the upper latch handle to make sure that the upper latch cable moves freely. Adjust the closing force of the upper latch handle (Ref. Fig. 504).
(a)Make sure that the lower latch handle is engaged.
(b)Loosen the top bolt through the torque box ring and latch ring. Use a

soft mallet and soft drift to tap the top 12.0 in. (304.8 mm) of the latch ring into the engine V-groove.

(c)Use the upper latch handle to engage the upper latch hook with the U-bolt.

(d)Adjust the position of the U-bolt.

1 Adjust the locknuts to get the necessary upper latch handle closing force of 15-25 lbf. (6.67-11.12 daN).

- Use a push-pull gage to make a measurement of the latch closing force 1.0 in. (25.4 mm) from the end of the latch handle.

(e)Make sure that the two ends of the U-bolt extend through the outer locknuts (B) a minimum of 0.040 in. (1.02 mm) (Ref. Fig. 502). There must be no more than two threads difference between the two ends of the U-bolt. If there is more than two threads difference, do step (d) again.

R Pre SB MRAS 78-1114

R (f)TORQUE the locknuts A to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN). Hold locknuts B so that they do not turn while you torque locknuts A (Ref. Fig. 502). Keep the upper latch handle closed.

R End Pre SB MRAS 78-1114

R Post SB MRAS 78-1114

R (f)TORQUE the non-locking nuts A to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN). Hold locknuts B so that they do not turn while you torque non-locking nuts A (Ref. Fig. 502). Keep the upper latch handle closed.

R End Post SB MRAS 78-1114

(17)Adjust the length of the upper latch cable as necessary to get the correct movement and clearance (Ref. Fig. 506).

(a)Adjust the length of the upper latch cable to get full rotation of the mechanism. The upper latch hook must touch the sleeve. There must be a clearance of 0.010-0.030 in. (0.25-0.76 mm) between the pin in the lower latch handle and the interlock slot in the upper latch handle (Ref. Fig. 504).

You can use 0.032-in. (0.81-mm) lockwire to check the clearance. The lockwire must not fit between the pin and the interlock slot.

1 Remove the pin to disconnect the clevis from the upper latch handle.

2 Loosen the clevis nut and turn the clevis as necessary.

3 Install the pin to connect the clevis to the upper latch handle.

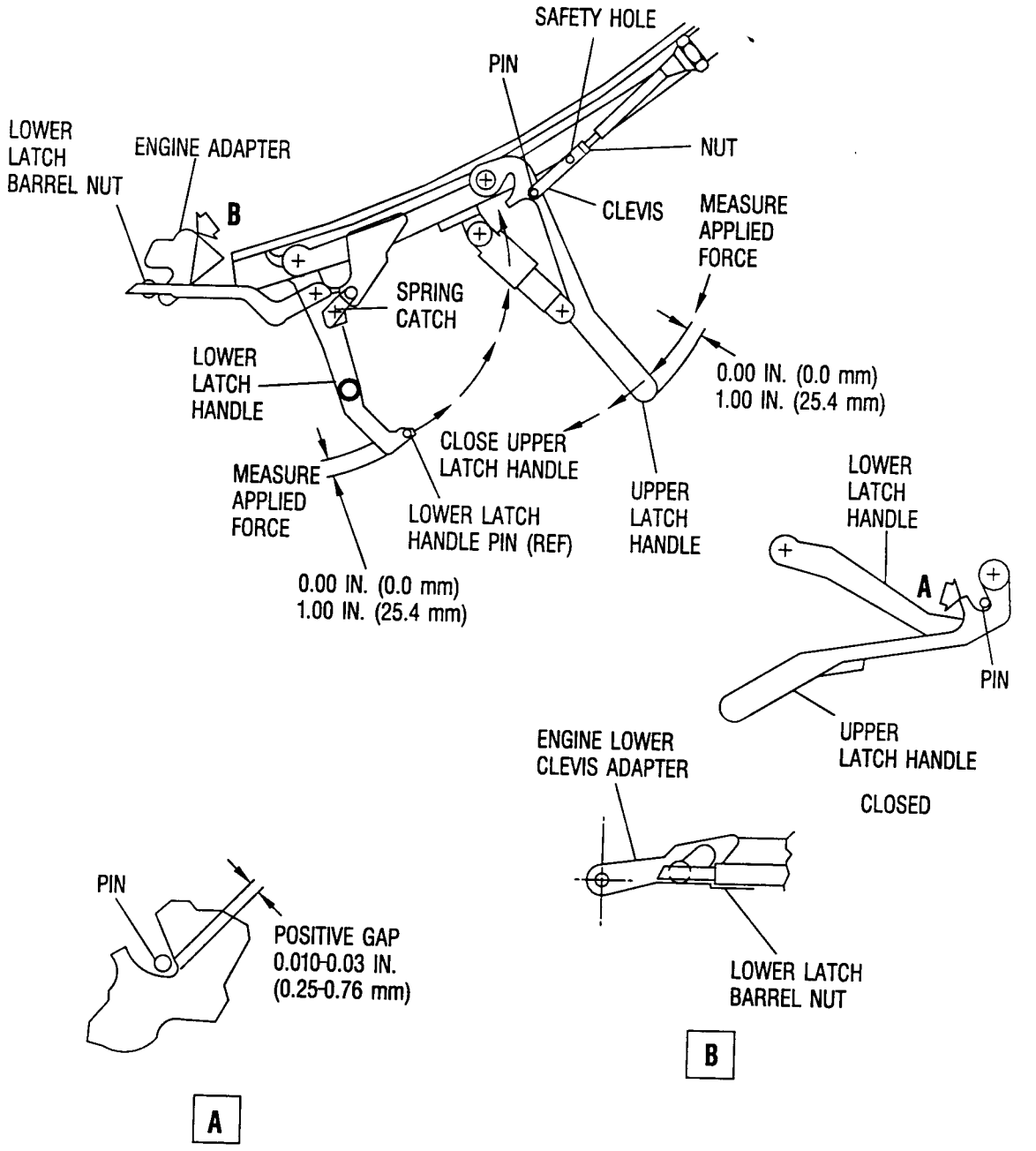
4 TORQUE the clevis nut to between 28 and 35 lbf.in. (0.32 and 0.40 m.daN).

5 Make sure that the threaded rod is installed sufficiently in the clevis. A 0.032-in. (0.81-mm) lockwire must not go through the safety hole in the clevis.

6 If the lockwire goes through the hole, do the steps that follow.

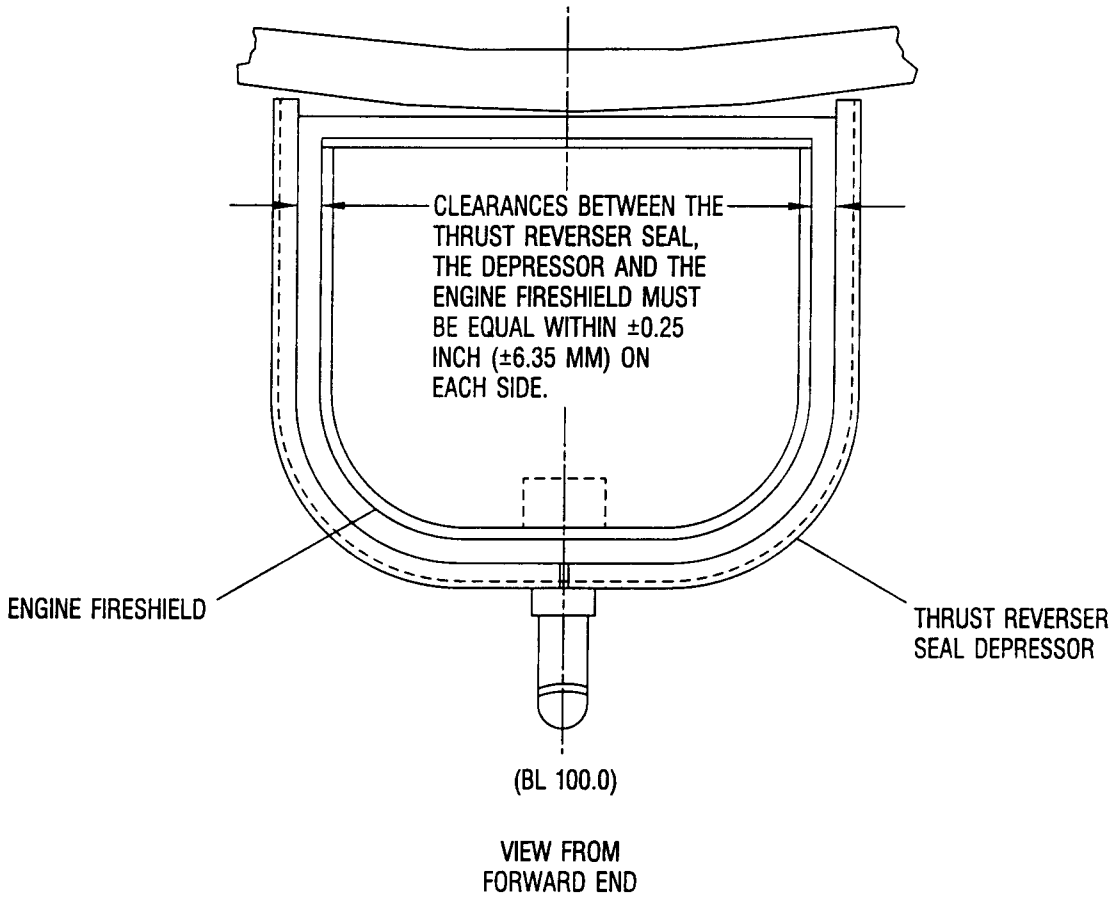
- Remove the pin to disconnect the clevis from the upper latch handle.
- Loosen the clevis nut and adjust the clevis until the lockwire cannot go through the hole.
- Install the pin to connect the clevis to the upper latch handle.
- TORQUE the clevis to between 28 and 35 lbf.in. (0.32 and 0.40 m.daN).

(b)Adjust the upper cable length at the upper cable rod end (Ref. Fig. 506).



BM5 71 13 08 5 LGM0 00

Adjustment of the Latch Handles
Figure 504


CLEARANCES BETWEEN THE THRUST REVERSER SEAL, THE DEPRESSOR AND THE ENGINE FIRESHIELD MUST BE EQUAL WITHIN ±0.25 INCH (±6.35 MM) ON EACH SIDE.
ENGINE FIRESHIELD
THRUST REVERSER SEAL DEPRESSOR
(BL 100.0)
VIEW FROM FORWARD END

LM10040-01-

BM5 71 13 08 5 LJM0 00

Thrust Reverser Lower Fireseal Compression Adjustments
Figure 505

1 Remove the bolt, the washer, and the nut that attach the rod end to the eccentric.
2 Loosen the jam nut and turn the rod end as necessary.
3 TORQUE the jam nut to between 28 and 35 lbf.in. (0.32 and 0.40 m.daN).
4 Install the bolt, the washer, and the nut that attach the rod end to the eccentric. TORQUE to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(c) Make sure that you get the results that follow when you adjust the upper latch cable.
1 The latch mechanism of the upper latch must close fully. This causes the upper latch hook to move tightly against the sleeve.
2 With the upper latch fully closed, there must be a clearance of 0.010-0.030 in. (0.25-0.76 mm) between the pin and the interlock slot of the upper latch handle (Ref. Fig. 504). You can use 0.032-in. (0.81-mm) lockwire to check the clearance. The lockwire must not fit between the pin and the interlock slot.

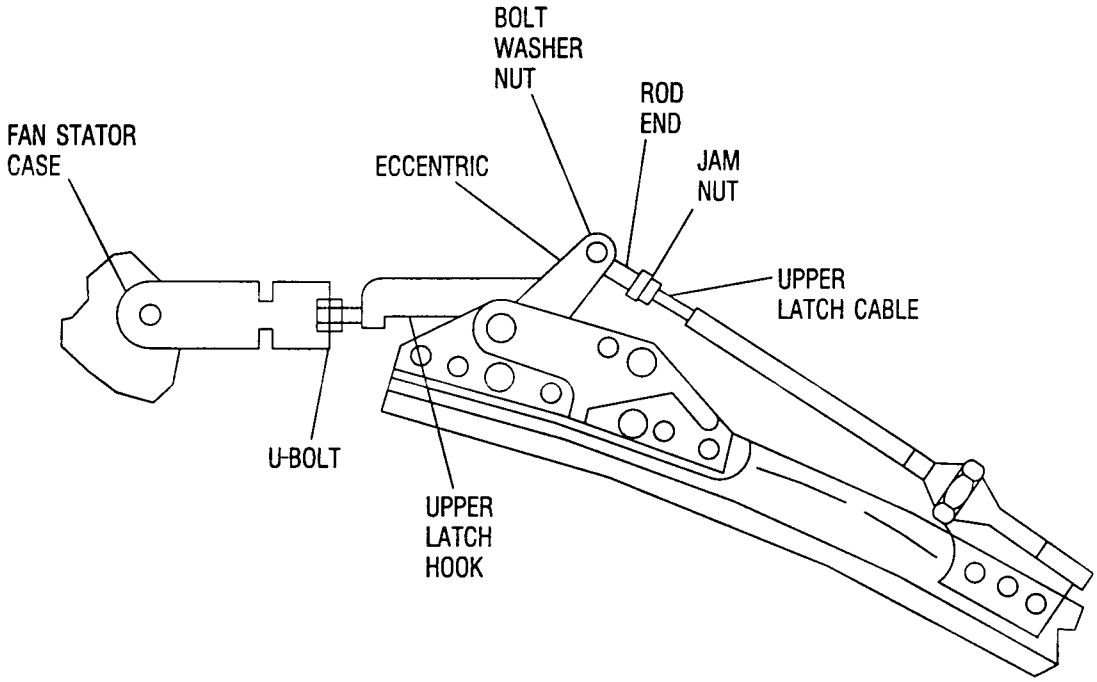
(18) Adjust the closing force of the upper latch again (Ref. Fig. 504).
(a) Make sure that the lower latch handle is engaged.
(b) Use the upper latch handle to engage the upper latch hook with the U-bolt.
(c) Adjust the position of the U-bolt. Use locknuts B to get the correct upper latch handle closing force of 25-75 lbf. (11.12-33.36 daN). (Ref. Fig. 502).
1 Use a push-pull gage to make a measurement of the latch closing force 1.0 in. (25.4 mm) from the end of the upper latch handle.
(d) Make sure that the two ends of the U-bolt extend through the outer locknuts (B) a minimum of 0.040 in. (1.02 mm). There must be no more than two threads difference between the two ends of the U-bolt. If there is more than two threads difference, do step (c) again.

Pre SB MRAS 78-1114
(e) TORQUE the locknuts A to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN). Hold locknuts B so that they do not turn while you torque
R locknuts A (Ref. Fig. 502). Keep the upper latch handle closed.
End Pre SB MRAS 78-1114
Post SB MRAS 78-1114
(e) TORQUE the non-locking nuts A to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN). Hold locknuts B so that they do not turn while you torque non-locking nuts A (Ref. Fig. 502). Keep the upper latch handle closed.
End Post SB MRAS 78-1114

(19) Complete the adjustments of the upper and lower latch closing force.
(a) Use a rubber mallet and a soft drift to tap the latch ring into the engine V-groove. Start from the center of the latch ring, and tap to the upper end. Go back to the center of the latch ring, and tap to the lower end.

CAUTION : DO NOT OPEN THE THRUST REVERSER HALVES UNTIL YOU TORQUE THE NUTS ON THE MINIMUM NUMBER OF ATTACH BOLTS.

(b) TORQUE the nuts on the latch ring attach bolts to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN). As a minimum, torque the nuts on the first and last bolt, and each nut at approximately 12.0-in (304.8 mm) intervals (or every tenth nut). Start at the top of the latch ring.



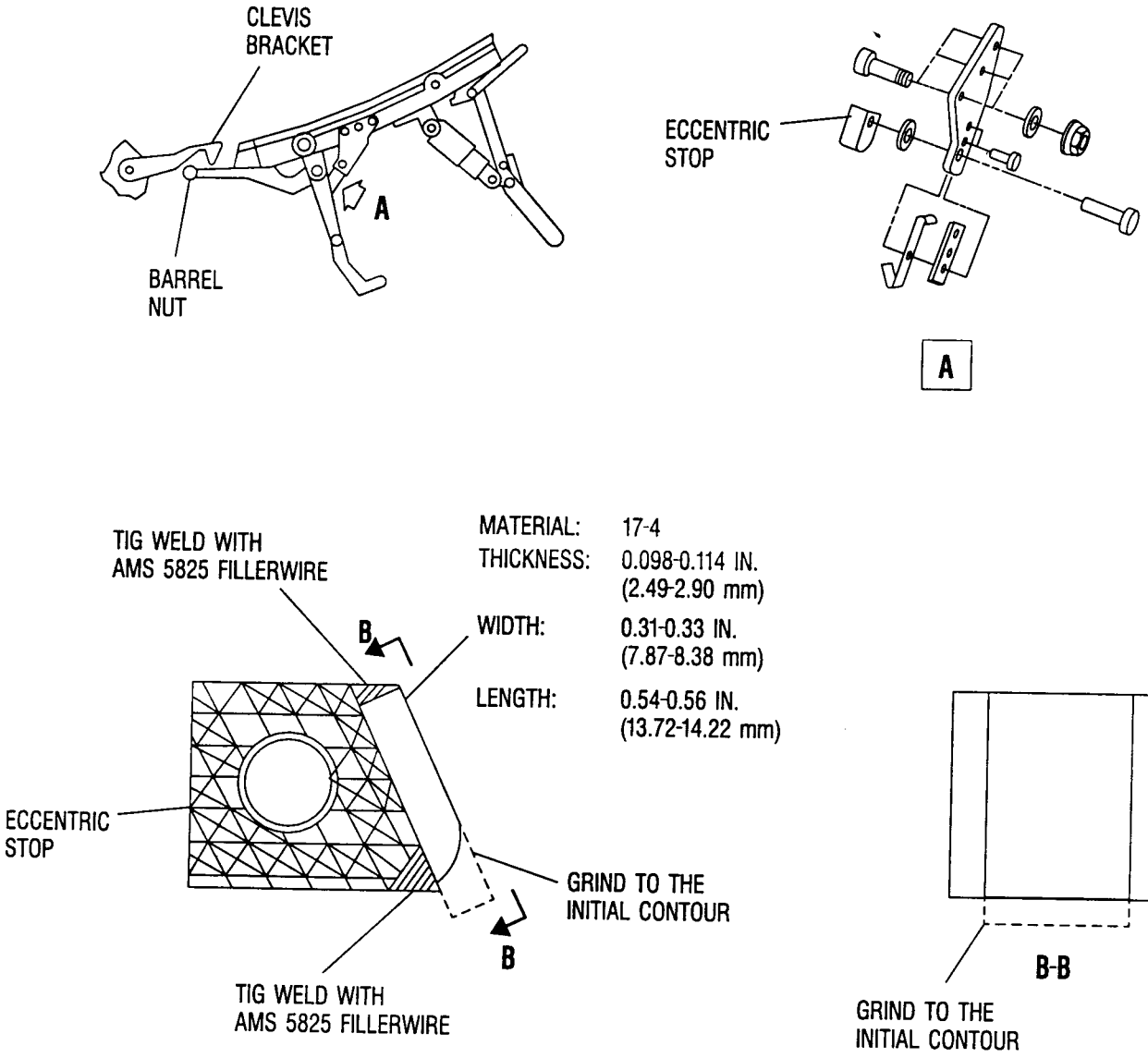
LM10041-00-A

BM5 71 13 08 5 LLM0 00

Upper Latch Cable Adjustment
Figure 506

(c)Actuate the upper latch handle to disengage the upper latch hook.
(d)Disengage the lower latch handle and adjust the barrel nut until the force necessary to close the lower latch handle is 25-75 lbf. (11.12-33.36 daN).
(e)Do a check of the upper latch closing force. Make sure that the force necessary to close the upper latch handle is 25-75 lbf. (11.12-33.36 daN). If the closing force is outside of the limits, do the steps that follow :
1 Use locknuts B (Ref. Fig. 502) to adjust the position of the U-bolt until you get a latch closing force of 25-75 lbf. (11.12-33.36 daN) for the upper latch handle.
- Make a measurement of the latch closing force 1.0 in. (25.4 mm) from the end of the upper latch handle.
2 Make sure that the two ends of the U-bolt extend through the outer locknuts (B) a minimum of 0.040 in. (1.02 mm). There must be no more than two threads difference between the two ends of the U-bolt. If there is more than two threads difference, do step 1 again.
3 TORQUE locknuts A to between 190 and 230 lbf.in. (2.15 and 2.60 m.daN). Hold locknuts B so they do not turn while you torque locknuts A. Keep the upper latch handle closed.
(20)Adjust the spring catch (Ref. Fig. 504).
(a)Open the lower latch handle fully, and bend the spring catch until the lower latch handle stays open.
1 Make sure that the eccentric stop turns the lower latch barrel nut out of the engine hook when you operate the lower latch handle. The barrel nut must be clear of the adapter. It must not touch adjacent hardware when the reverser half is opened or closed. The barrel nut should engage the adapter when you close the lower latch handle. If you cannot get the correct adjustment, you must modify the eccentric stop (Ref. Fig. 507).
(21)Complete the torque of the nuts on the latch ring bolts.
WARNING : DO NOT USE THE HOLD OPEN ROD WHEN THE FOUR BOLTS THAT ATTACH THE HOLD OPEN ROD BRACKET TO THE THRUST REVERSER FORWARD FRAME ARE LOOSE. TO DO SO CAN CAUSE INJURY TO PERSONS OR DAMAGE TO THE EQUIPMENT.
(a)Open the thrust reverser (ref. 71-13-00, P. Block 301).
(b)TORQUE the nuts on all of the loose latch ring attach bolts to between 50 and 70 lbf.in. (0.57 and 0.79 m.daN).
(c)Make sure that the engine V-groove and the mounting ring latch assembly are clean and free from grease or oil (Ref. 78-32-00, P. Block 601).
(d)Close the thrust reverser (Ref. 71-13-00, P. Block 301).
(22)If necessary, do all of the applicable steps in this procedure for the opposite thrust reverser half.
(23)Reactive the thrust reverser (Ref. 78-31-00, P. Block 901).

C. Close-Up
(1)Make sure that the work area is clean and clear of tools and miscellaneous items of equipment.



BM5 71 13 08 5 LNMO 00

Latch Ring Eccentric Stop Adjustment
Figure 507

MOUNTS - DESCRIPTION AND OPERATION

1. General

A. The engine installation uses a two-point fail-safe mount linkage system to support the engine from the pylon. The mounts attach the engine to the aircraft and transmit thrust loads from the engine to the pylon structure.

B. The thrust link system, mount bolts, and aft mount rails have protection from single element failure by a dual load path. In case of a failure in a thrust link, or in one of their pivots, the axial clearance in the forward support would be taken up. The forward support, with the remaining half of the link system, would transmit the thrust to the pylon. At the aft mount, retainer plates are attached to the engine case rails to provide a dual load path. This protects against mount rail failures. All critical bolts and pivots in the mount system are locked with retainer plates in two locations and standard locking procedures.

C. The engine mount system is made of :
- A forward mount, located on the aft side of the fan frame struts.
- An aft mount, located on the turbine exhaust case flange.

2. Description

A. Forward Mount (Ref. Fig. 001)

(1) The forward mount is made to be resistant to flight maneuver forces, ground movement loads, and loads that result from some types of events. The forward mount assembly is resistant to side, vertical, and thrust torque loads.

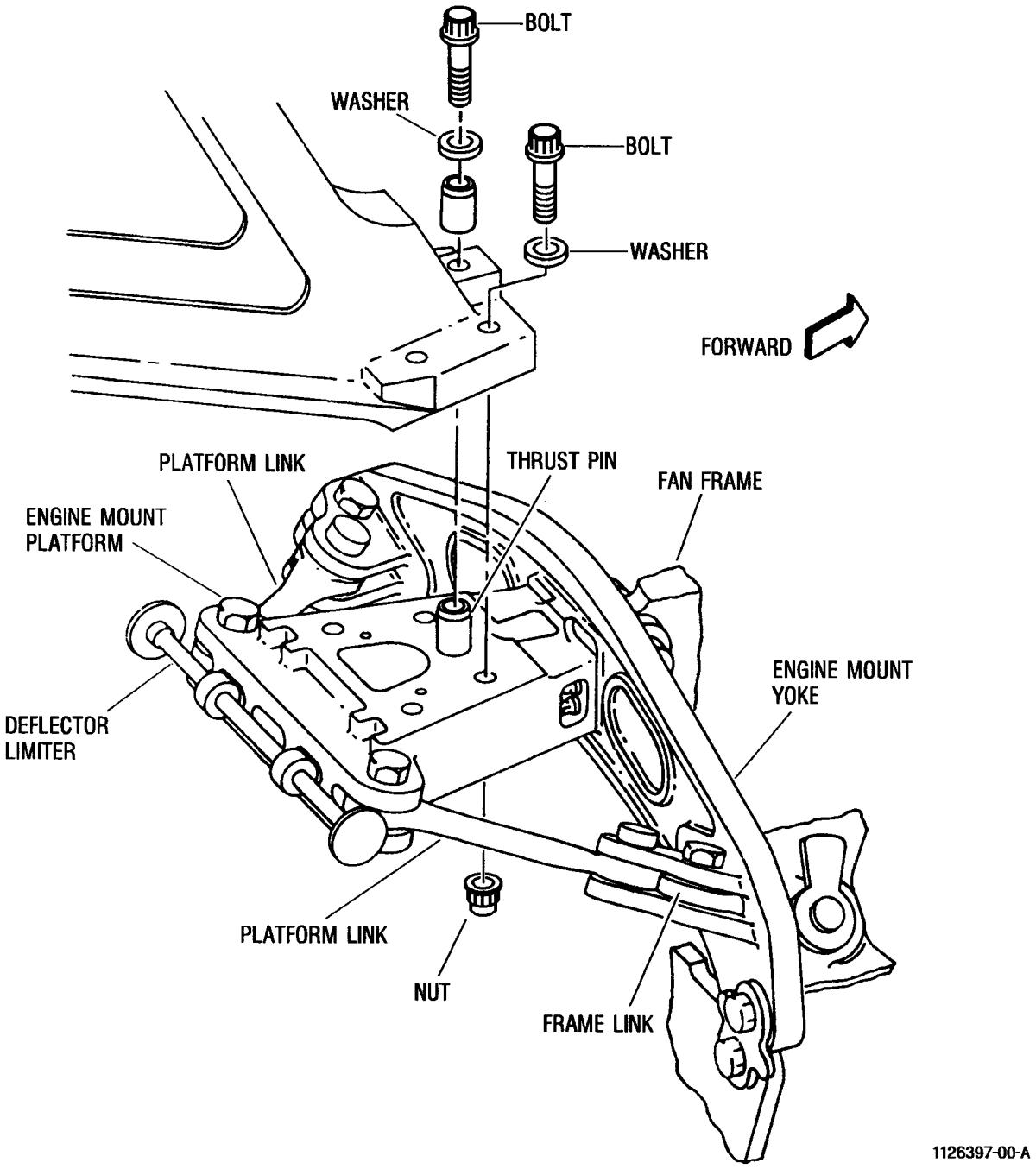
(2) The forward mount assembly has a yoke assembly, four thrust link assemblies, and a platform. The yoke assembly is connected by thrust links to the fan frame on the forward side. On the aft side of the fan frame the yoke is connected by thrust links to the mount platform. The yoke is connected to the compressor forward flange by two vertical links. The mount platform is rigidly attached to the pylon pyramid by a thrust pin and five bolts. One bolt is installed through the thrust pin. (Ref. Fig. 003)

B. Aft Mounts (Ref. Fig. 002)

(1) The aft mount is mode to be resistant to vertical and side loads to the pylon. The aft mount does not limit the engine axially. The mount does have sufficient forward and aft clearance to permit thermal expansion of the engine. It also transmits thrust loads from the engine to the pylon during operation.

(2) The aft mount is made of the pylon adapter, the lower beam, and two side links. The pylon adapter beam is attached to the pylon with bolts. The aft mount lower beam is attached to the adapter beam with four tension bolts. The top of this beam is the engine-to-pylon interface. The two side links bolt to the engine and the aft mount lower beam. The rear mount is made to be resistant to vertical, side, and engine torque loads.

(3) The engine aft mount attaches to the pylon aft-mount attach point and the rails on the exhaust case. To prevent damage during installation, the



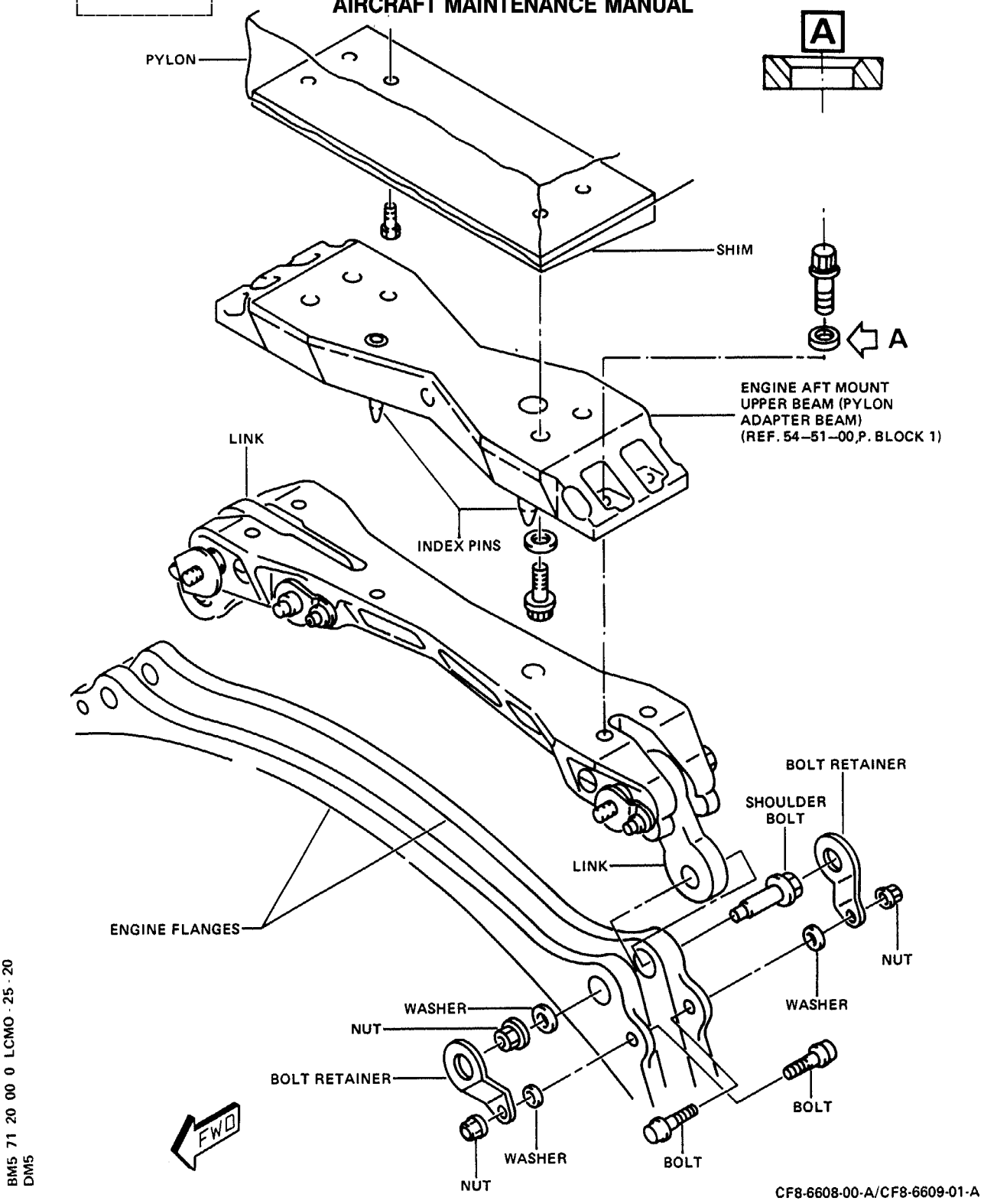
BM5 71 20 00 0 LAM0 02

Forward Mount
Figure 001

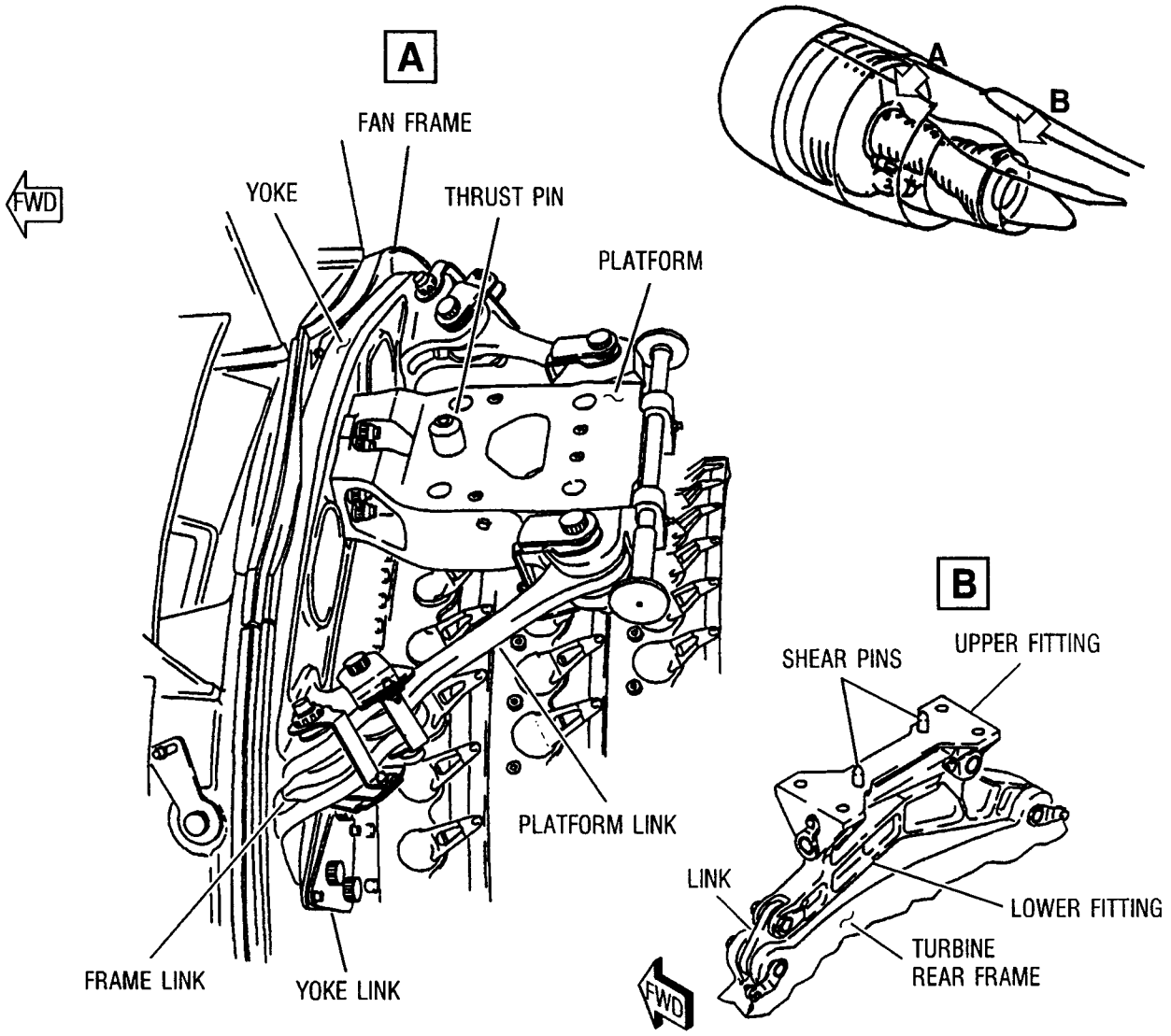
pylon connection has two alignment shear pins that go into the aft mount. The aft mount is attached to the aircraft with four larger attachment bolts (Ref. Fig. 003).

3. Material

The forward mount platform is machined from Ti-6-4 and the links are machined from INCONEL 718. The aft mount beams and links are machined from Inconel 718 forgings.



Aft Mount
Figure 002



FORWARD ENGINE MOUNT

AFT ENGINE MOUNT

BM5 71 20 00 0 LEMO - 00

Engine Mount Component Location
Figure 003

ENGINE FORWARD MOUNT - REMOVAL/INSTALLATION

1. General

A. This procedure provides the instructions for the removal and installation of the engine forward mount.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Torque Wrench 15-115 lbf.in. (0.17 - 1.30 m.daN)
C.	Torque Wrench 36 - 220 lbf.in. (0.40 - 2.48 m.daN)
D.	Torque Wrench 96 - 900 lbf.in. (1.08 - 10.17 m.daN)
E. Material No.C02-001	Anti-Seize Compounds, Lubricants, Oil (Ref. 70-00-00)
F. Material No.C02-060	Anti-Seize Compounds, Lubricants, Oil (Ref. 70-00-00)
Referenced Procedure - 71-00-00, P. Block 401	Power Plant

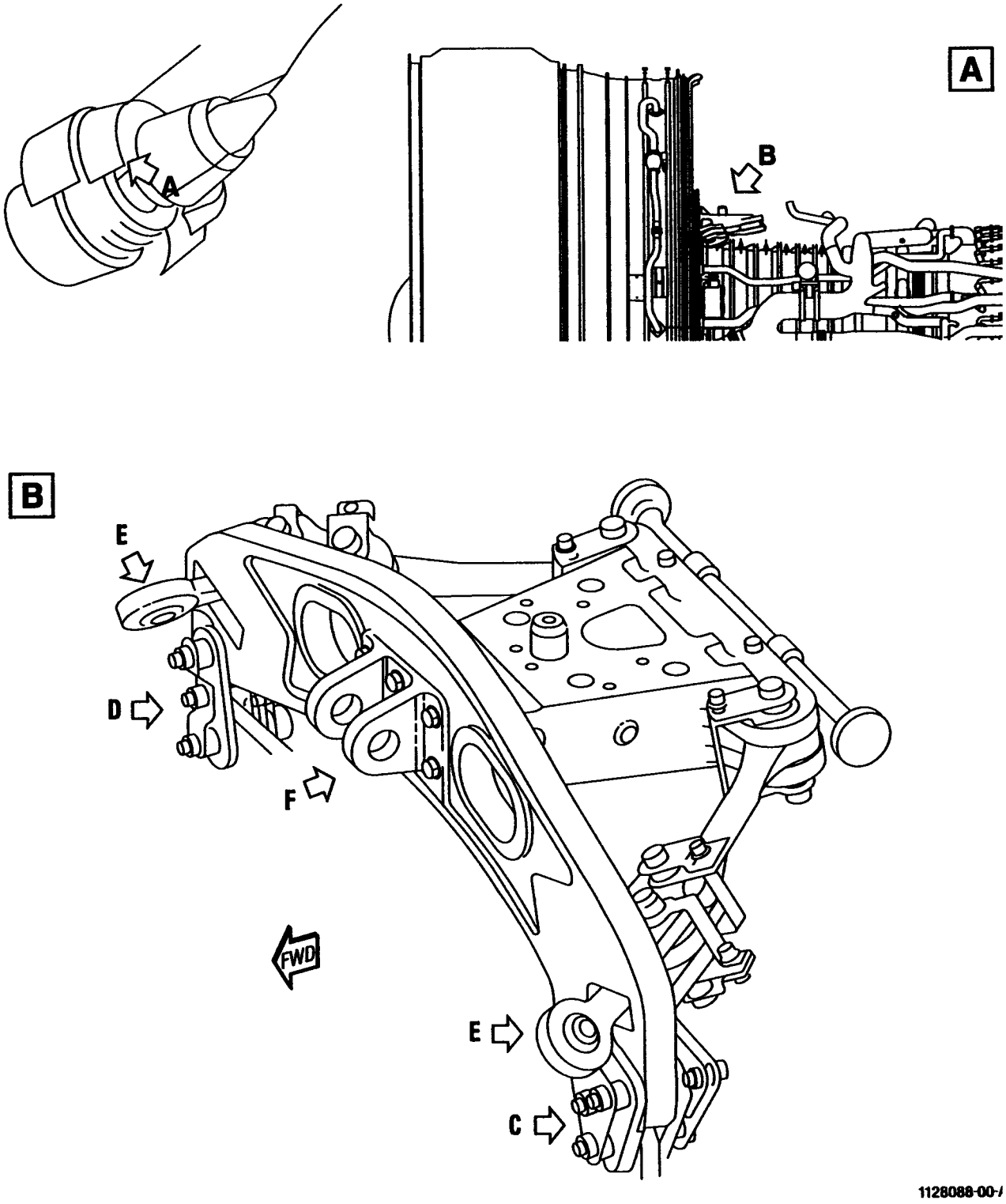
3. Procedure

A. Job Set-up
(1)Install the access platform.
(2)Remove the power plant (Ref. 71-00-00, P. Block 401).

B. Removal (Ref. Fig. 401)
(1)Disconnect the left forward and aft link halves from the engine yoke assembly and the fan frame as follows :
(a)Remove the two nuts, washers, and bolts that attach the nut retainer to the aft link half.
(b)Remove the nut retainer.
(c)Remove the nut, washer, and screw that attach the bolt retainer to the forward link half.
(d)Remove the bolt retainer.
(e)Remove the three bolts, nuts, spacers, and flanged bushing that attach the forward and aft link half and the lockplate to the fan frame lug and yoke.
(f)Remove forward link half, lockplate, and aft link half.
(2)Disconnect the right forward and aft link halves from the engine yoke assembly and the fan frame as follows :
(a)Remove the two nuts, washers, and bolts that attach the nut retainer to the lockplate on the aft link half.
(b)Remove the nut retainer.
(c)Remove the nut, washer, and screw that attach the bolt retainer to the forward link half.

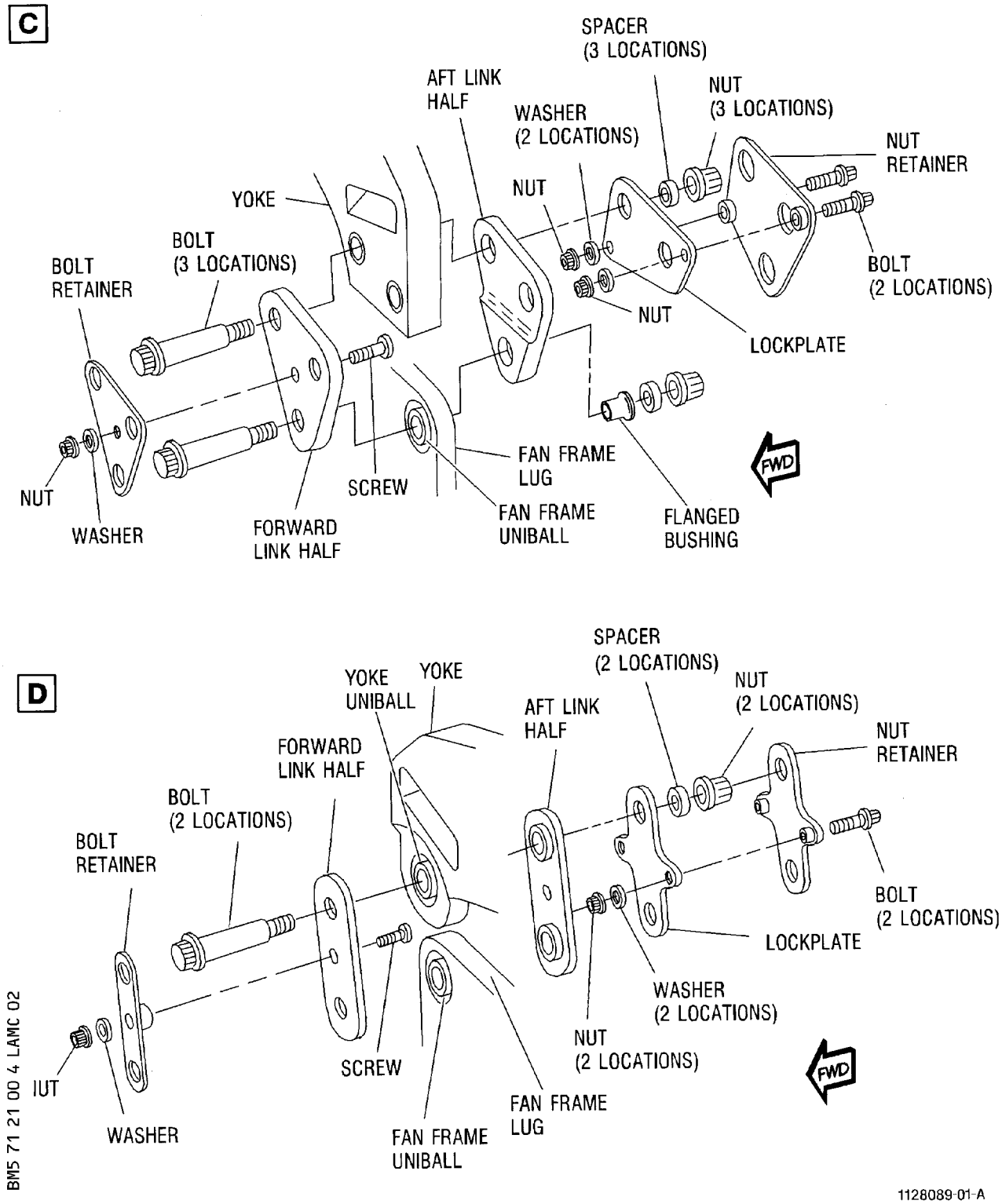
(d)Remove the bolt retainer.
(e)Remove the two nuts, spacers, and bolts that attach the forward and aft link halfs and lockplate to the fan frame and yoke.
(f)Remove forward link half, lockplate, and aft link half.
(3)Disconnect the frame links from the left and right sides of the fan frame as follows :
Pre SB GE 72-612
(a)Remove the two nuts, washers, and spacers that attach the two bolt retainers to the fan frame. Remove the bolt retainers.
End Pre SB GE 72-612
Post SB GE 72-612
(a)Remove the two nuts, washers, and spacers that attach the two nut brackets to the fan frame. Remove the nuts brackets.
End Post SB GE 72-612
Pre SB GE 72-612
(b)Remove the four nuts, washers, and laminated shims that attach the two nut retainers to the fan frame. Remove the nut retainers.
End Pre SB GE 72-612
Post SB GE 72-612
(b)Remove the four nuts and washers that attach the two support brackets and bolt brackets to the fan frame. Remove the support brackets and bolt retainers.
End Post SB GE 72-612
(c)Remove the two nuts, bolts, and four bushings that attach the left and right frame links to the fan frame.
(4)Remove the nut, washer, shoulder bolt, and bolt sleeve that attach the forward mount to the fan frame lug.
(5)Remove the forward engine mount from the engine.

C. Installation (Ref. Fig. 401)
R NOTE : All nuts used in the assembly and installation of the
R forward engine mount are self-locking nuts.
R You must do the torque check for re-use of self-locking nuts
R (Ref. 70-00-00, P. Block 201, Para. 6.J.). on all the nuts
R used in this installation procedure.
(1)Attach the forward engine mount clevis to the engine as follows :
(a)Apply a layer of Material No.C02-060 to the shank of the shoulder bolt.
(b)Apply a layer of Material No.C02-001 to the threads of the shoulder bolt.
(c)Install the forward engine mount to the fan frame lug. Make sure that the forward frame links are aligned with the lugs in the fan frame.
(d)Install the shoulder bolt, bolt sleeve, washer, and nut.
(e)TORQUE the nut to between 500 and 550 lbf.in. (5.65 and 6.21 m.daN).
(2)Attach the frame links to the left and right sides of the fan frame as follows :
(a)Apply a layer of Material No.C02-060 to the shank of the shoulder bolts.
(b)Apply a layer of Material No.C02-001 to the threads of the shoulder bolts.
Pre SB GE 72-612



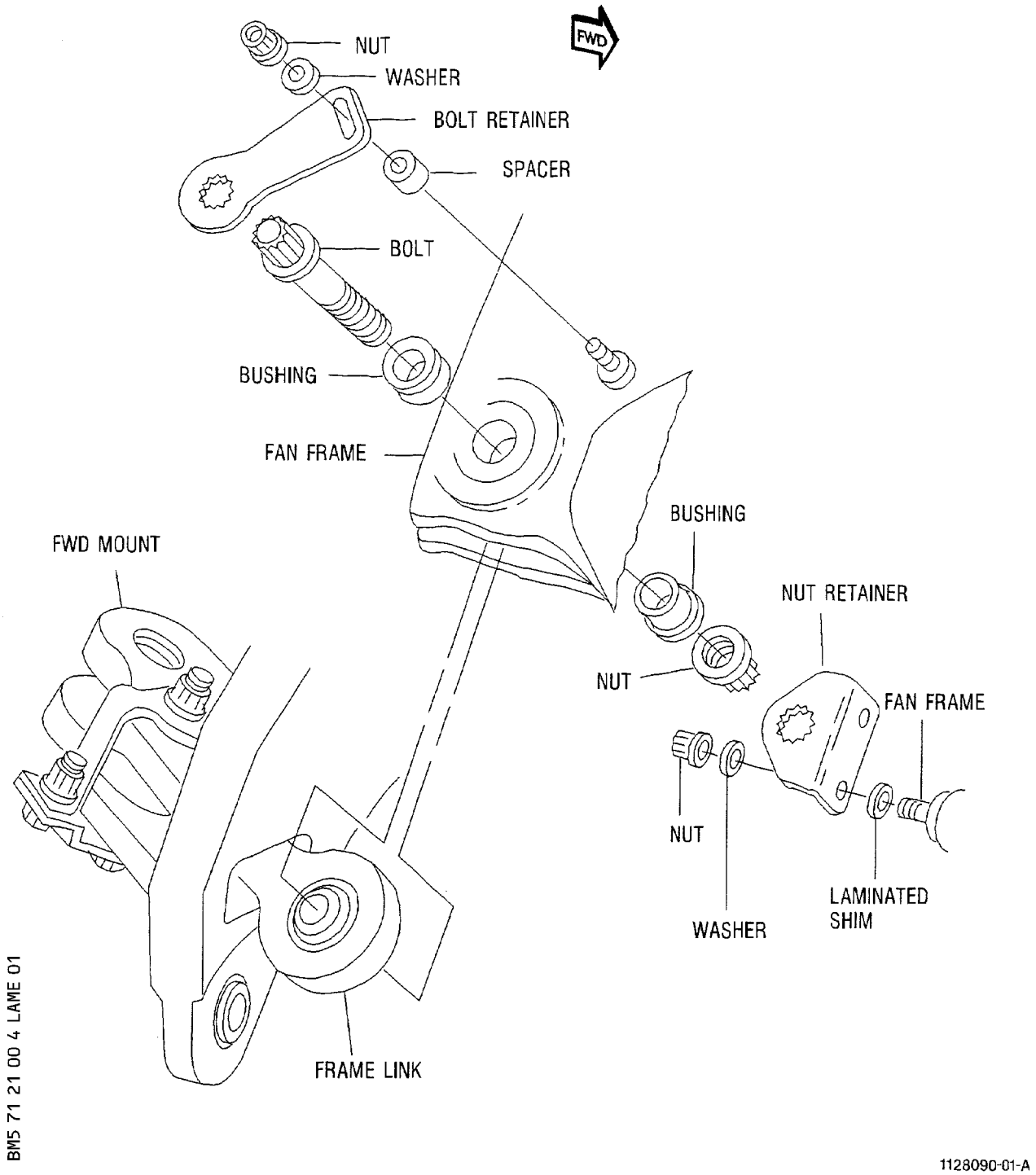
BM5 71 21 00 4 LAMA 00

Forward Engine Mount
(Sheet 1/4)
Figure 401



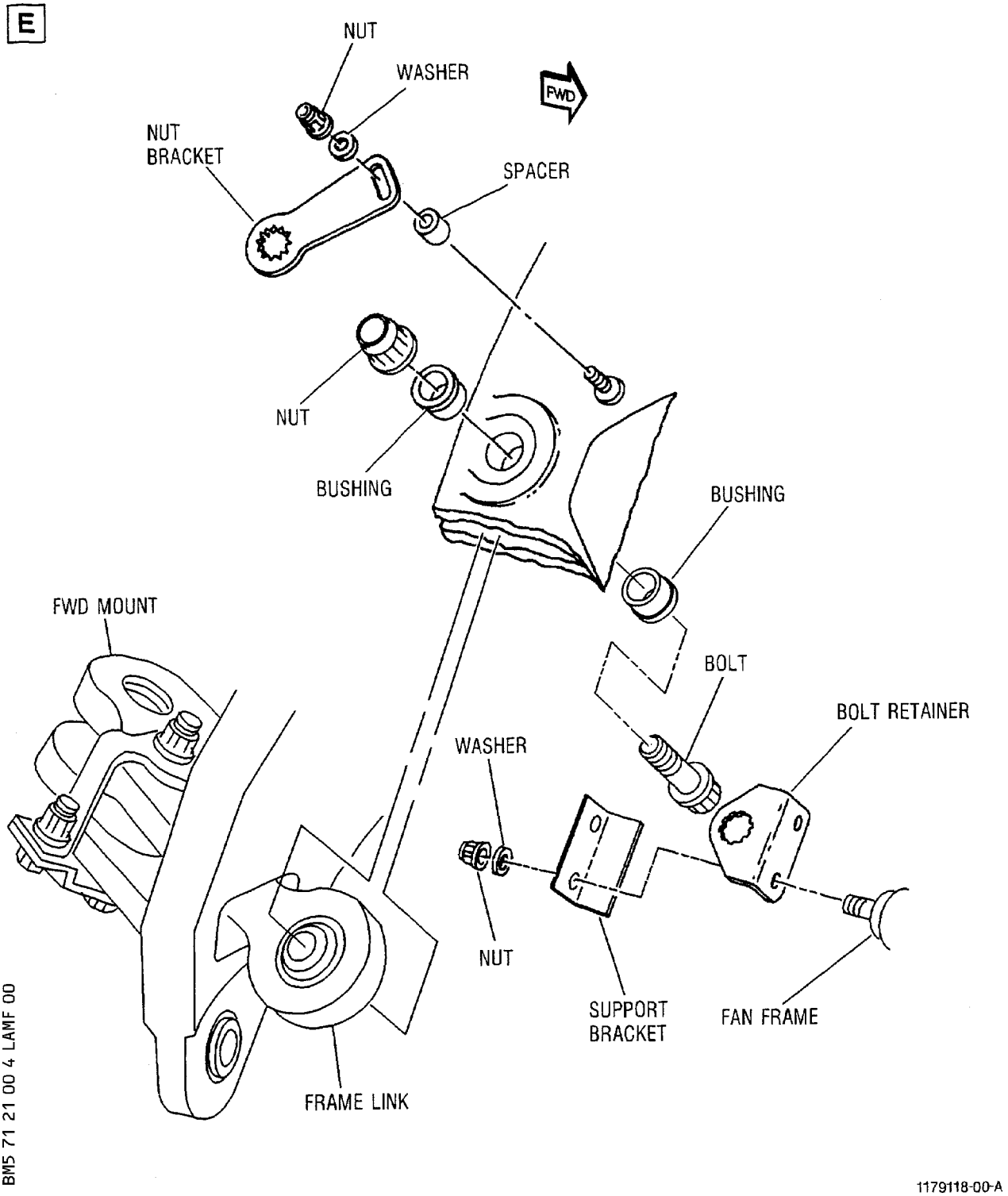
Forward Engine Mount
(Sheet 2/4)
Figure 401

E

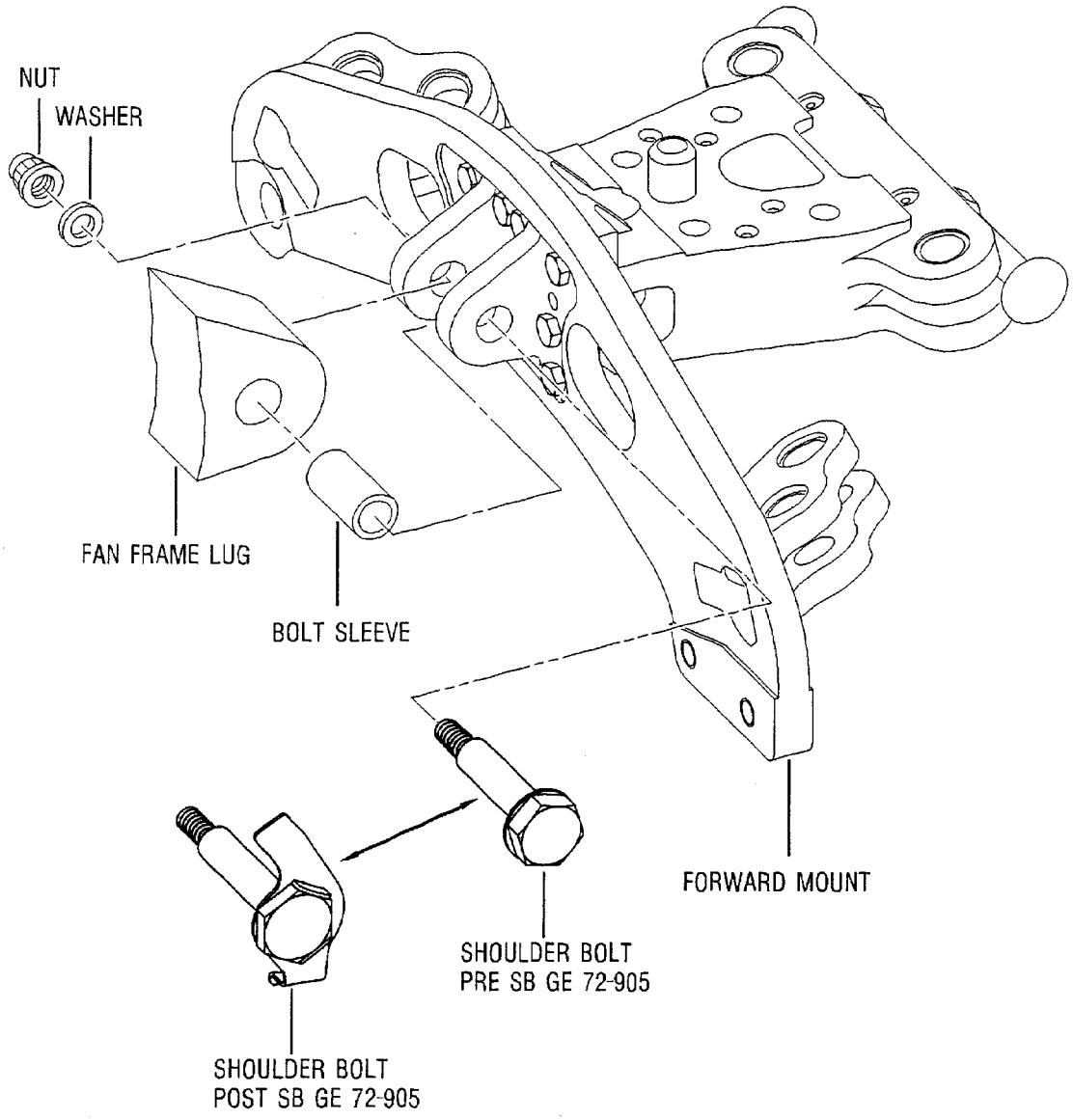


Forward Engine Mount (Pre SB GE 72-612)
(Sheet 3/4)
Figure 401

E



Forward Engine Mount (Post SB GE 72-612)
(Sheet 3/4)
Figure 401



BM5 71 21 00 4 LAMG 01

1128091-01-A

Forward Engine Mount
(Sheet 4/4)
Figure 401

(c)Install the two bolts, four bushings, and two nuts from the outboard side of the fan frame to attach the left and right frame links to the fan frame.

End Pre SB GE 72-612

Post SB GE 72-612

(c)Install the two bolts, four bushings, and two nuts from the inboard side of the fan frame to attach the left and right frame links to the fan frame.

End Post SB GE 72-612

(d)TORQUE the nuts to between 350 and 400 lbf.in. (3.95 and 4.52 m.daN).

Pre SB GE 72-612

(e)Install the two spacers, washers, and nuts to attach the two bolt retainers to the studs on the fan frame.

End Pre SB GE 72-612

Post SB GE 72-612

(e)Install the two spacers, washers, and nuts to attach the two nut brackets to the studs on the fan frame.

End Post SB GE 72-612

(f)TORQUE the nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

Pre SB GE 72-612

(g)Install the four laminated shims, washers and nuts to attach the two nut retainers to the fan frame.

End Pre SB GE 72-612

Post SB GE 72-612

(g)Install the four spacers, washers, and nuts to attach the two bolt retainers and support brackets to the fan frame.

End Post SB GE 72-612

(h)TORQUE the nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(3)Install the right forward and aft link halves to the engine yoke assembly and the fan frame as follows :

(a)Apply a layer of Material No.C02-060 to the shank of the shoulder bolts.

(b)Apply a layer of Material No.C02-001 to the threads of the shoulder bolts.

(c)Lubricate fan frame lug and yoke uniballs with a layer of Material No.C02-060.

CAUTION : MAKE SURE THAT THE FORWARD AND AFT LINK HALVES ARE INSTALLED WITH THE BOSSES FACING THE UNIBALLS IN THE FAN FRAME LUG AND YOKE. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE ENGINE MOUNT.

(d)Install two bolts through the bolt holes in the forward link half. Make sure that the bosses on the forward link half are facing the uniballs in the fan frame lug and yoke.

(e)Put the bolt retainer over the two bolt heads on the forward link half. Attach the bolt retainer to the forward link half with the screw, washer, and nut to make a forward link half bolt assembly

(f)TORQUE the forward link half bolt assembly screw and nut to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(g)With the bolt heads on the forward link half in the forward position, install the bolt assembly through the yoke and fan frame lug.

CAUTION : MAKE SURE THAT THE FORWARD AND AFT LINK HALVES ARE INSTALLED

WITH THE BOSSES FACING THE UNIBALLS IN THE FAN FRAME LUG AND YOKE. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE ENGINE MOUNT.

(h)Install the aft link half with the bosses facing the uniballs in the fan frame lug and yoke on the bolts.

(i)Install the lockplate, spacers, and nuts on the two installed bolts. TORQUE the two nuts to between 95 and 115 lbf.in. (1.07 and 1.30 m.daN).

(j)Install the nut retainer over the installed nuts. Attach the nut retainer to the lockplate with two bolts, two washers, and two nuts. TORQUE the two nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(4)Install the left forward and aft link halves to the engine yoke assembly and the fan frame as follows :

(a)Apply a layer of Material No.C02-060 to the shank of the shoulder bolts.

(b)Apply a layer of Material No.C02-001 to the threads of the shoulder bolts.

(c)Lubricate fan frame lug uniball with a layer of Material No.C02-060.

CAUTION : MAKE SURE THAT THE FORWARD AND AFT LINK HALVES ARE INSTALLED WITH THE BOSSES FACING THE UNIBALL IN THE FAN FRAME LUG. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE ENGINE MOUNT.

(d)Install three bolts through the bolt holes in the forward link half. Make sure that the boss on the forward link half is facing the uniball in the fan frame lug.

(e)Put the bolt retainer over the three bolt heads on the forward link half. Attach the bolt retainer to the forward link half with the screw, washer, and nut to make a forward link half bolt assembly

(f)TORQUE the forward link half bolt assembly screw and nut to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

(g)With the bolt heads on the forward link half positioned forward, install the bolt assembly through the yoke and fan frame lug.

CAUTION : MAKE SURE THAT THE FORWARD AND AFT LINK HALVES ARE INSTALLED WITH THE BOSSES FACING THE UNIBALL IN THE FAN FRAME LUG. AN INCORRECT INSTALLATION WILL CAUSE DAMAGE TO THE ENGINE MOUNT.

(h)Install the aft link half with the boss facing the uniball in the fan frame lug on the installed bolts.

(i)Install the flanged bushing in the lower hole on the aft link half.

(j)Install the lockplate, spacers, and nuts on the installed bolts. TORQUE the three nuts to between 95 and 115 lbf.in. (1.07 and 1.30 m.daN).

(k)Install the nut retainer over the installed nuts. Attach the nut retainer to the lockplate with two bolts, washers, and nuts. TORQUE the two nuts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN).

D. Close-Up

(1)Install the power plant (Ref. 71-00-00, P. Block 401).

(2)Make sure the work area is clean and clear of tools and other items of equipment.

(3)Remove the access platform.

ENGINE FORWARD MOUNT - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
Referenced Procedure - 71-00-00, P. Block 401	Power Plant - General

2. Procedure

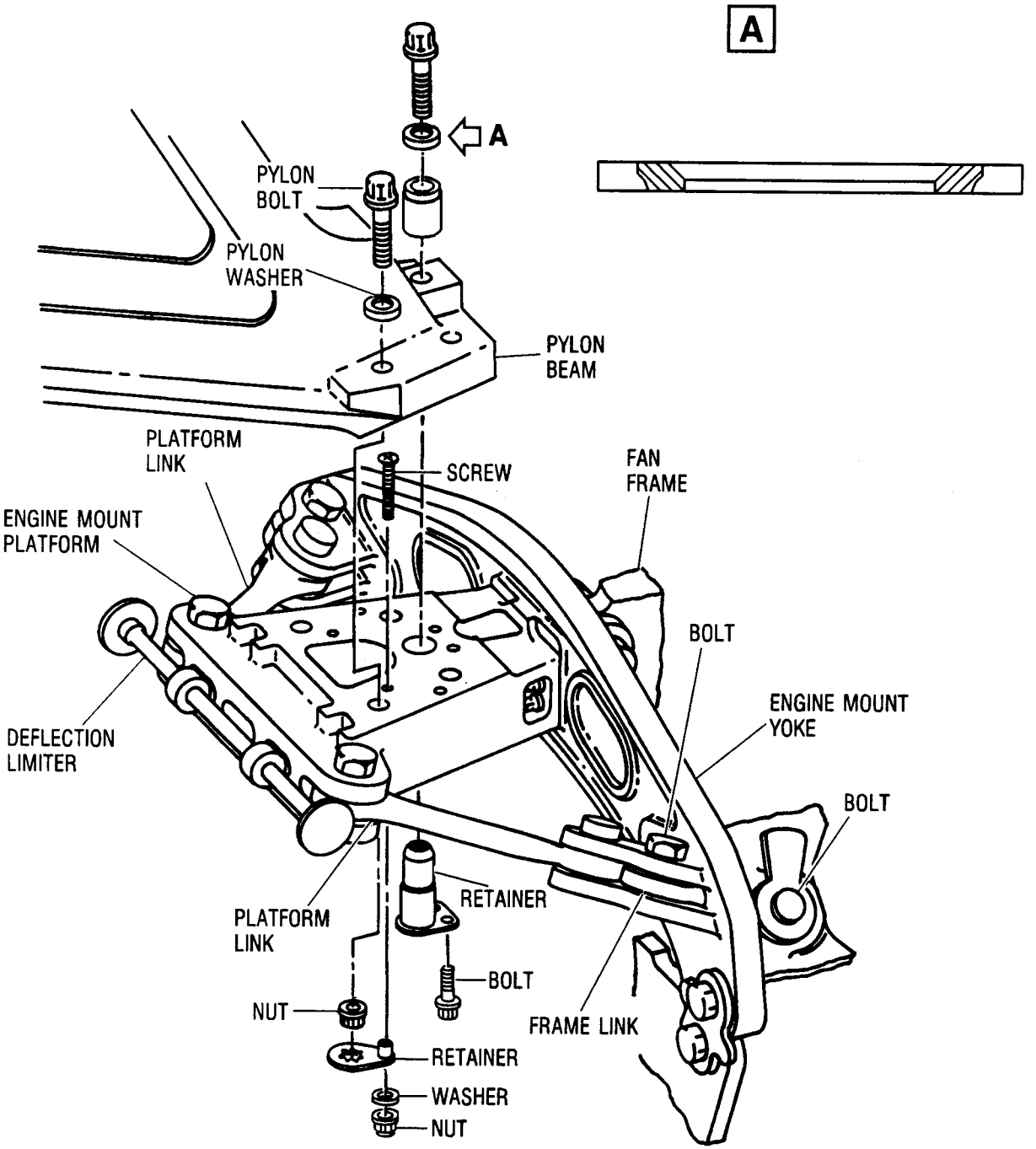
A. Job Set-up
(1)Remove power plant (Ref. 71-00-00, P. Block 401).

B. Inspection/Check (Ref. Fig. 601)

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1)Forward Engine Mount and Mount Link for :		
(a)Cracks	Not serviceable	
(b)Nicks, dents and scratches	Three every 4 sq. in. (25.8 cm2), 0.030 in. (0.76 mm) deep. Scratches not to exceed one in. (25.4 mm) in length	Blend
(c)Fretting, pickup and high metal	Any amount 0.003 in. (0.08 mm) deep after removal of high metal	Blend
(d)Damaged pylon mount nuts	Not serviceable	Replace nuts
(2)Forward Engine Mount Pylon Bolts Fluorescent Penetrant Inspect (Ref. 70-00-00, P. Block 201) for :		
(a)Cracks	Not serviceable	Replace bolt
(b)Transverse indications	Not serviceable	Replace bolt
(c)Single or multiple laps at thread root	Not serviceable	Replace bolt
(d)Longitudinal indications interpreted as inclusions or seams	Permitted, if they do not break across corners or fillet radii	
(e)Laps not deeper	Permitted on thread crest and	

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
than 0.006 in. (0.15 mm)	on the nonpressure face of the thread outside the pitch diameter	
(3)Forward Engine Mount Pylon Washers Fluorescent Penetrant Inspect (Ref. 70-00-00, P. Block 201) for :		
(a)Indications less than 0.030 in. (0.76 mm) long	Permitted, if not closer than 0.050 in. (1.27 mm)	
(b)Indications between 0.030 and 0.060 in. (0.76 and 1.52 mm) long	Permitted, if not cracks	

C. Close-Up
(1)Install power plant (Ref. 71-00-00, P. Block 401).



BM5 71 21 00 6 LAMD 03

Engine Forward Mount
Figure 601

AFT MOUNT - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the engine aft mount.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B. Material No.C02-058	Anti-Seize Compounds, Lubricants, Oils (Ref. 70-00-00)
C.	Torque Wrench 50-1020 lbf. in. (0.56 - 11.52 m.daN)
Referenced Procedure - 71-00-00, P. Block 401	Power Plant

3. Procedure

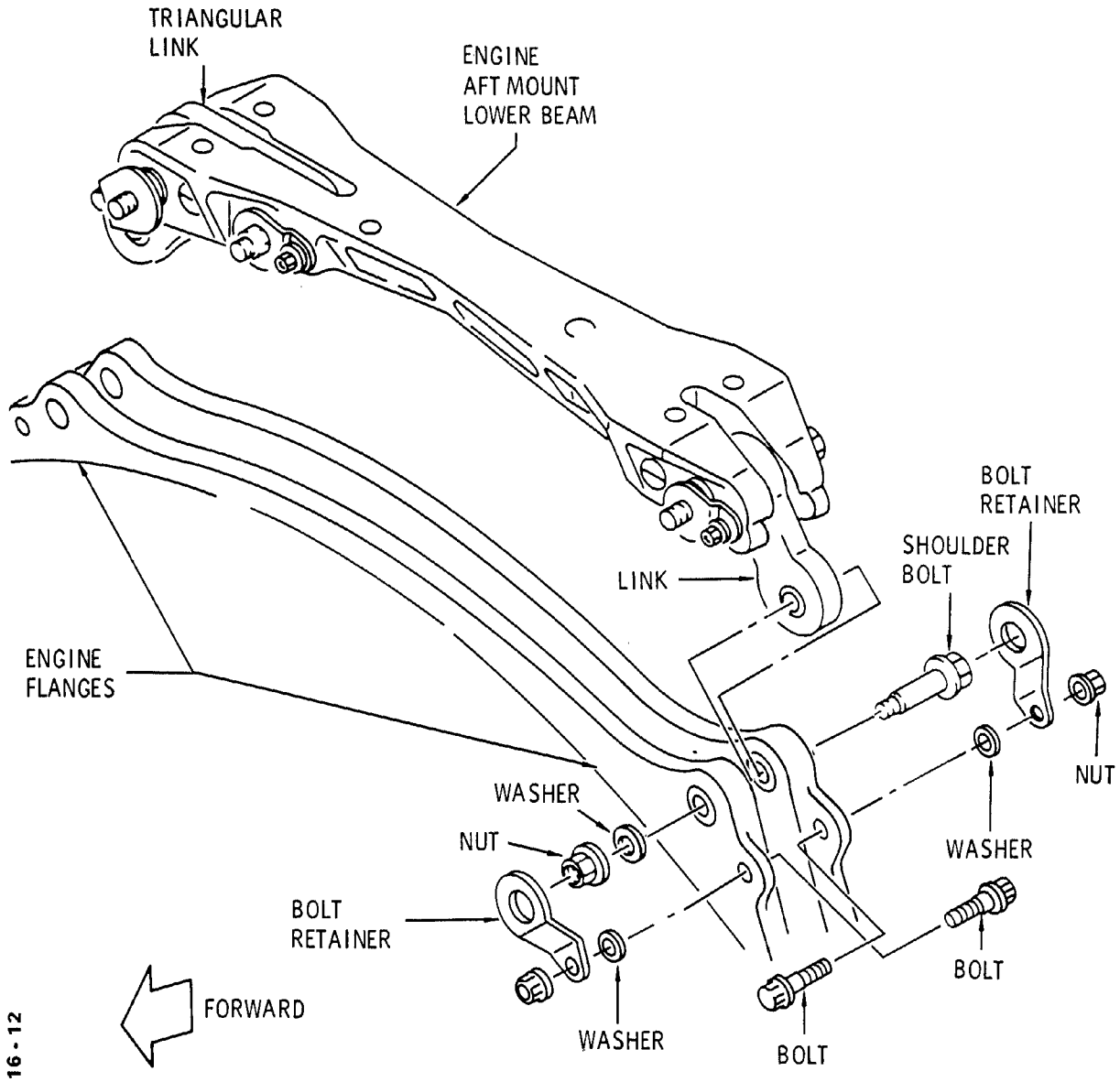
A. Job Set-Up
(1)Install access platform.
(2)Remove power plant (Ref. 71-00-00, P. Block 401).

B. Removal (Ref. Fig. 401)
(1)Remove bolts, washers, nuts and bolt retainers from engine flange.
(2)Remove nuts, washers and shoulder bolts from mount links and engine flanges and remove mount.

C. Installation (Ref. Fig. 401)
(1)Position links between engine flanges with triangular link to the right of engine centerline (aft looking forward).

(2)Lubricate the threads and washer face of shoulder bolts and two retainer bolts with Material C02-058.
(3)Install shoulder bolts, washers and nuts. Install bolts with heads facing aft. TORQUE nuts to between 24 and 34 lbf.ft. (3.25 and 4.61 m.daN).
(4)Install bolt retainers on shoulder bolt and nut and align with bolt holes in engine flange.
(5)Secure bolt retainers with bolts, washers and nuts. TORQUE nuts to between 55 and 70 lbf. in. (0.62 and 0.79 m.daN).

D. Close-Up
(1)Install power plant (Ref. 71-00-00, P. Block 401).
(2)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(3)Remove access platform.



BM5 71 22 00 4 LAMO-16-12
DM5

Engine Aft Mount
Figure 401

ENGINE AFT MOUNT - INSPECTION/CHECK

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
Referenced Procedures	
- 70-00-00, P. Block 201	Standard Practices
- 71-00-00, P. Block 401	Power Plant
- 71-13-00, P. Block 301	Cowl Doors
- 71-13-01, P. Block 501	Core Cowl Dors
- 71-22-00, P. Block 601	Engine Aft Mount

2. Procedure

A. Job Set-Up
(1)Remove power plant (Ref. 71-00-00, P. Block 401).
(2)Remove/disassemble engine aft mount (Ref. 71-22-00, P. Block 401).

B. Inspection/Check (Ref. Fig. 601)

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(1) Aft Mount for :		
(a) Cracks	No cracks allowed	Replace if defective
(b) Corrosion	Any amount up to 0.005 in. (0.13 mm) deep	Blend
(c) Nicks/ Scratches	One per every 4 sq in. (26 sq cm), 0.015 in. (0.38 mm) deep, 1 in. (25.0 mm) long. No sharp grooves allowed	Blend
(d) High metal on mating surfaces	No high metal allowed	Remove high metal
(e) Fretting on lower beam interface	Any amount not exceeding 0.003 in. (0.08 mm) after removal of high metal	
	Any amount not exceeding 0.007 in. (0.18 mm) deep on interface surface and not to exceed 10% of interface area	Blend

INSPECT/CHECK	MAXIMUM SERVICEABLE LIMITS	REMARKS
(f) Link bearing race displacement	None allowed	Replace link

(2) Aft Engine Mount Pylon Bolts Fluorescent Penetrant Inspect (Ref. 70-00-00, P. Block 201) for :

(a) Cracks	Not serviceable	Replace bolt
(b) Transverse indications	Not serviceable	Replace bolt
(c) Single or multiple laps at thread root	Not serviceable	Replace bolt
(d) Longitudinal indications interpreted as inclusions or seams	Permitted, if they do not break across corners or fillet radii	
(e) Laps not deeper than 0.006 in. (0.15 mm)	Permitted on thread crest and on the nonpressure face of the thread outside the pitch diameter	

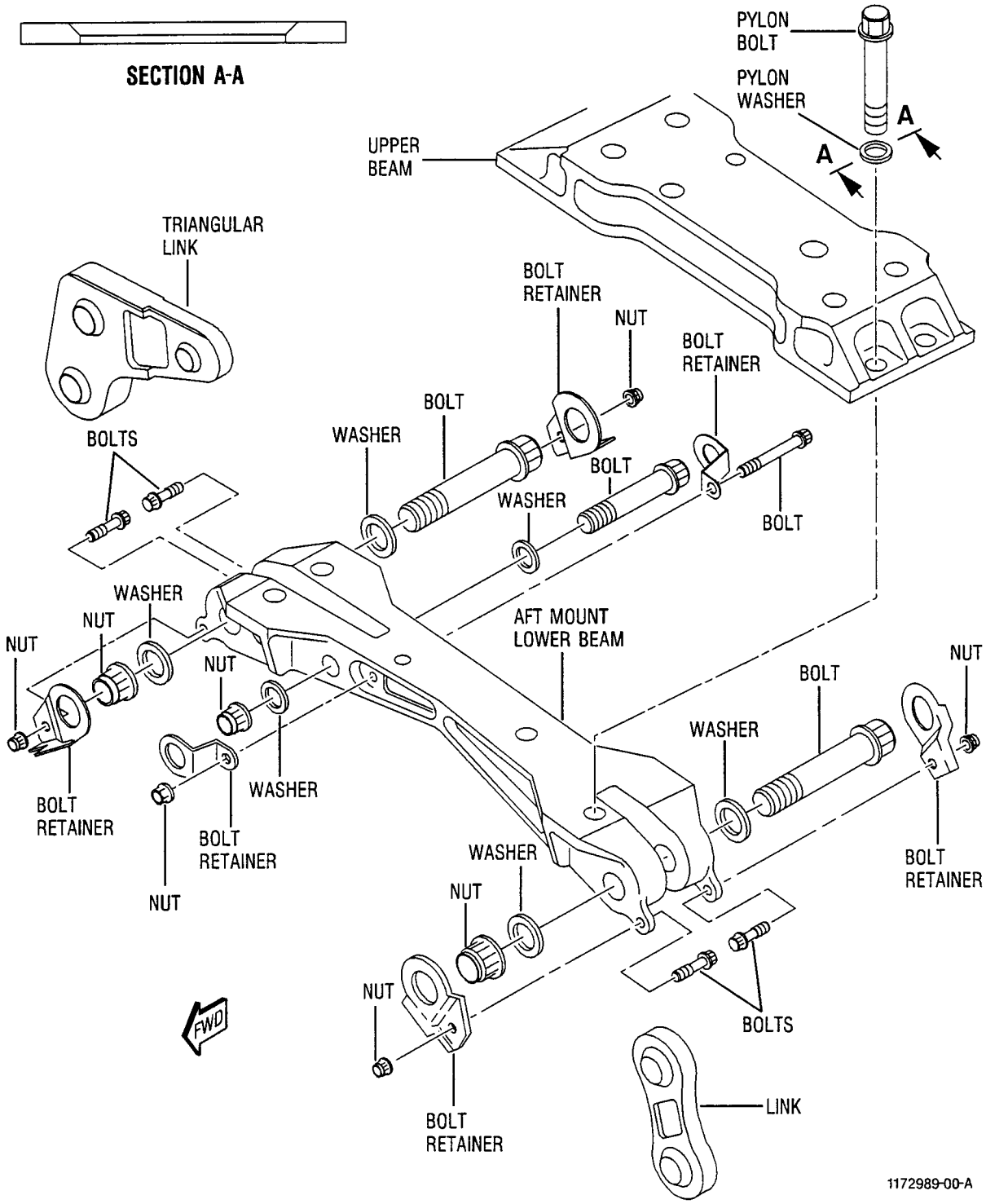
(3) Aft Engine Mount Pylon Washers Fluorescent Penetrant Inspect (Ref. 70-00-00, P. Block 201) for :

(a) Indications less than 0.030 in. (0.76 mm) long	Permitted, if not closer than 0.050 in. (1.27 mm)	
(b) Indications between 0.030 and 0.060 in. (0.76 and 1.52 mm) long	Permitted, if not cracks	

C. Close-Up

(1)Install engine aft mount (Ref. 71-22-00, P. Block 401).

(2)Install power plant (Ref. 71-00-00, P. Block 401).



BM5 71 22 00 6 LAMO 01

Engine Aft Mount
Figure 601

FIRE SEALS - DESCRIPTION AND OPERATION

1. General

The fire seals are bulkheads made of fireproof material. The fire seals divide the cavities located between the engine and the nacelle into compartments, in order to prevent propagation of fire (FAR 25-1191). The nacelle is equipped with fire seals in upper and lower bifurcations between core and fan compartments.

The general functions of these fire seals are as follows :

- To prevent hot air from circulating from the core compartment into the fan compartment.
- To avoid propagation of fire toward a source of air which could contribute to combustion, and which could cause dilution in the concentration of the extinguishing agent.
- To facilitate the most effective means of fire detection and extinguishment by dividing the nacelle into more manageable compartments.

2. Description (Ref. Fig. 001)

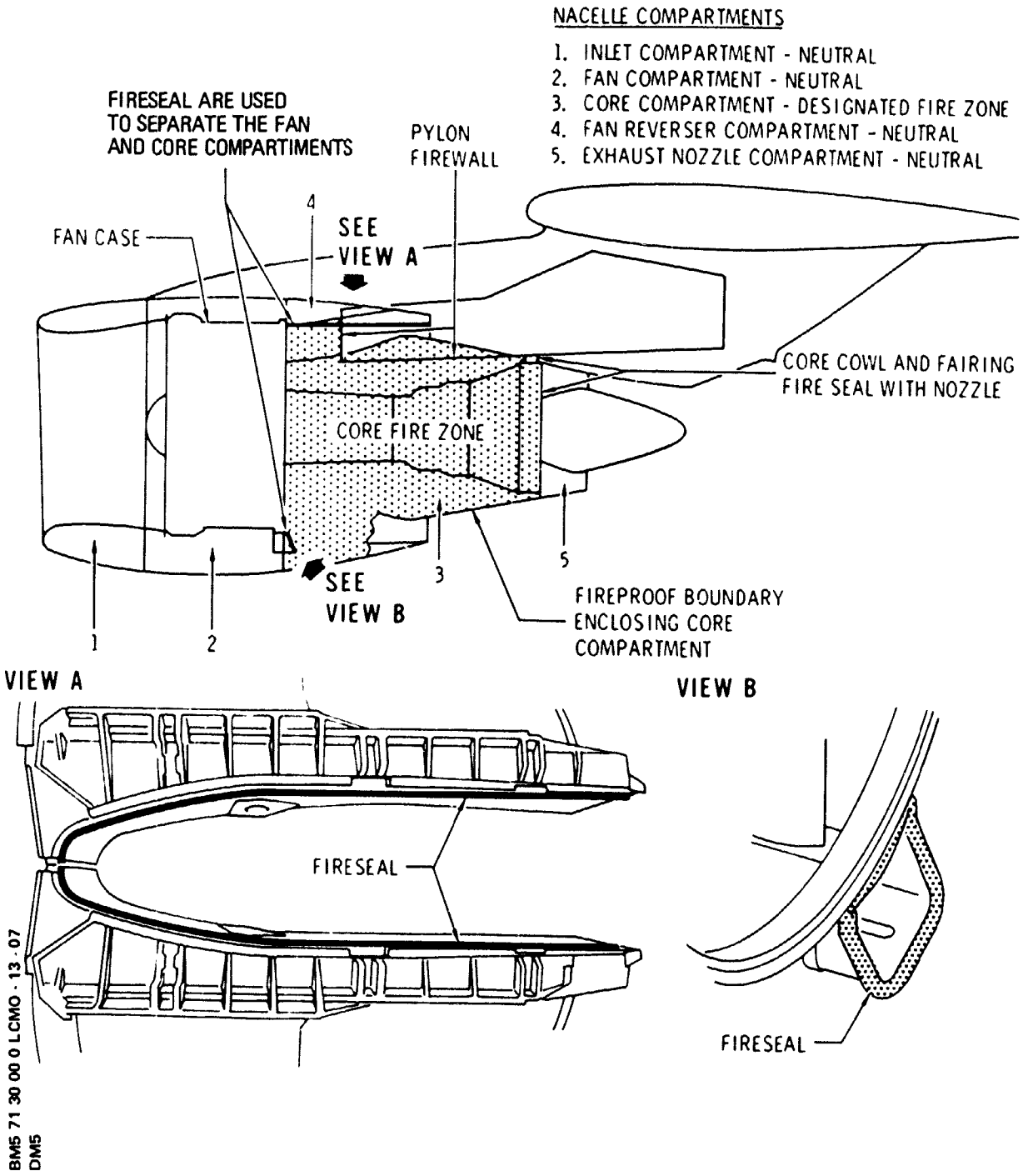
The fire seals in upper and lower bifurcations separate the fan compartment non-fire zone from the core compartments fire zone.

A. Upper Section

It is a horizontal fire seal of steel above the front mount that closes off the passage between the pylon, and thrust reverser cowls. It is mounted on the pylon and has a seal strip at the outer edge to seal against mating thrust reverser cowl surfaces.

B. Lower Section

The lower section consists of a vertical fire seal of titanium. It is mounted from the engine fan frame casing and has a seal strip on the outer edge that mates with reverser cowling. Both upper and lower fireseals have lines passing through them using bulkhead seals.


NACELLE COMPARTMENTS
1. INLET COMPARTMENT - NEUTRAL
2. FAN COMPARTMENT - NEUTRAL
3. CORE COMPARTMENT - DESIGNATED FIRE ZONE
4. FAN REVERSER COMPARTMENT - NEUTRAL
5. EXHAUST NOZZLE COMPARTMENT - NEUTRAL
FIRESEAL ARE USED TO SEPARATE THE FAN AND CORE COMPARTIMENTS
PYLON FIREWALL
FAN CASE
SEE VIEW A
SEE VIEW B
CORE COWL AND FAIRING FIRE SEAL WITH NOZZLE
CORE FIRE ZONE
FIREPROOF BOUNDARY ENCLOSING CORE COMPARTMENT
VIEW A
VIEW B
FIRESEAL
FIRESEAL
BM5 71 30 00 0 LCMO - 13 - 07
DM5

Nacelle Compartments-Neutral and Fire Zones
Figure 001

ATTACH FITTINGS - DESCRIPTION AND OPERATION

1. General

Attach fittings and brackets are provided on the engine to attach the equipment, lines, ducts and electrical harnesses to the engine case flanges and accessory gearbox.

The attach points are treated or primed with an insulating coating in order to avoid direct contact and electrolytic action between dissimilar metals.

ATTACH FITTING - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the brackets.

B. Access to the brackets is through the fan cowl and thrust reverser doors (Ref. 71-13-00, P. Block 301).

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 20-70 lbf.in. (0.23 - 0.79 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up
Open, safety and tag all circuit breakers for the appropriate engine and open fan cowl and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal of Brackets
(Ref. Fig. 402, 403, 404)
(Ref. Fig. 405, 406, 407)
(Ref. Fig. 408, 409, 410)
(Ref. Fig. 411, 412, 413)
(Ref. Fig. 414, 415)
(1)Remove brackets from left fan case as follows :
(a)Remove bolts, washers, and nuts attaching brackets 5 and 10 to flange FLG170.
(b)Remove bolts, washers, and nuts attaching brackets 25, 30, 35, 40, 45, 50, and 55 to flange FLG173.
(c)Remove bolts, washers, and nuts attaching brackets 60, 65, 70, and 75 to flange FLG178.
(d)Remove bolts, washers, and nuts attaching bracket 78 and 80 to flange FLG185.
(e)Remove bolts, washers, and nuts attaching brackets 84, 85, 90, 92 and 95 to flange FLG189.
(f)Remove bolts and washers attaching channel 100 to brackets 97 and 105.
(g)Remove bolts, washers, and nuts attaching brackets 91 and 105 to flange FLG170 and engine bracket on flange FLG144.
(h)Remove bolts, washers, and nuts attaching bracket 110 to flange FLG173.
(i)Remove bolts, washers, and nuts attaching brackets 110 and 115 to flange FLG178.
(j)Onto the forward side of aft "T" ring (Ref. Fig. 401).

1 Remove three bolts, three washers and three nuts attaching bracket to "T" ring at approximately the 6:30 o'clock position.
2 Remove three bolts, three washers and three nuts attaching bracket to "T" ring at approximately 9:30 o'clock position.
3 Remove four bolts, four washers, four nuts attaching bracket to "T" ring at approximately the 10:30 o'clock position.

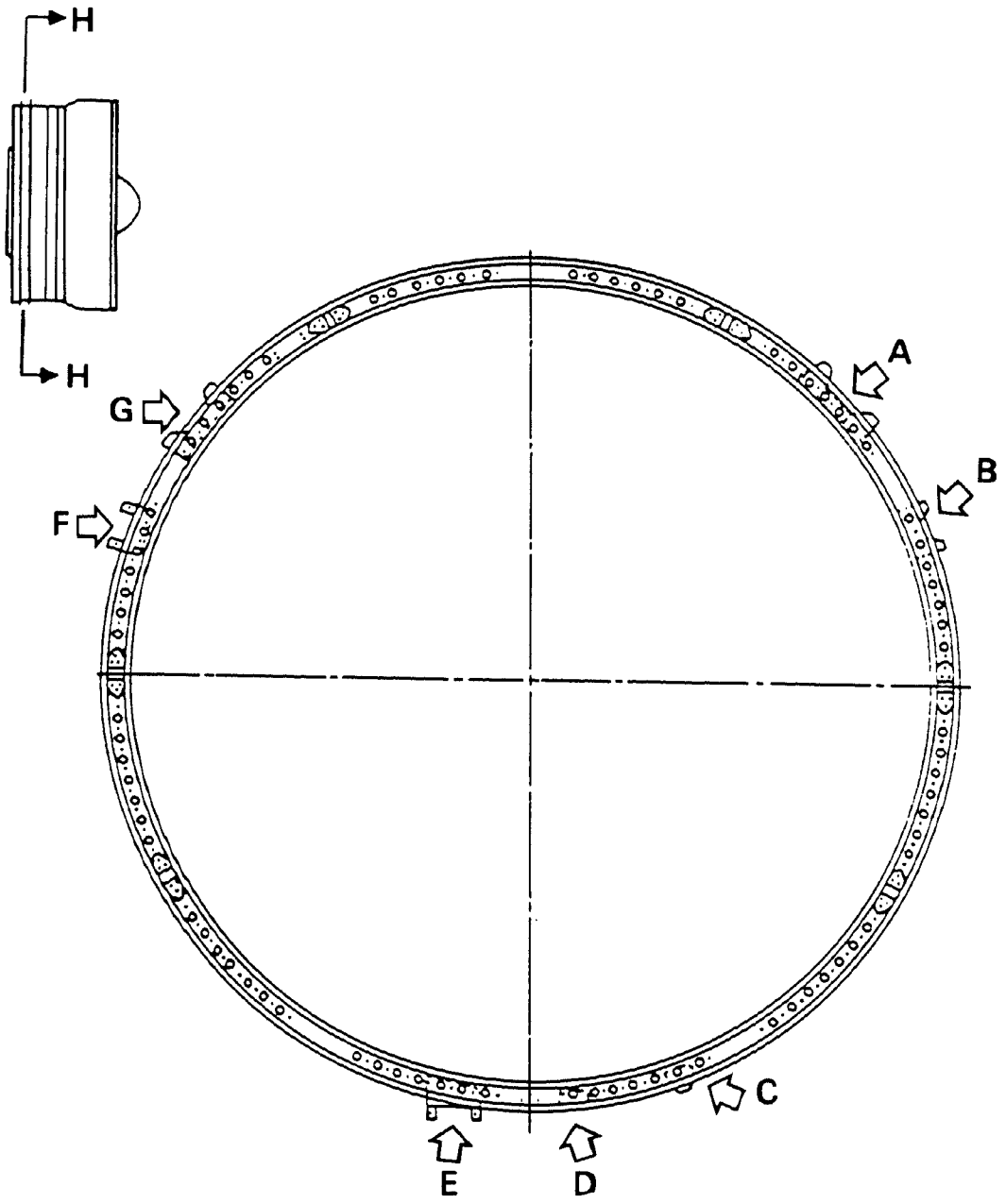
(2)Remove brackets from right fan case as follows :
(a)Remove bolts, washers, and nuts attaching brackets 120, 125, 130 and 135, to flange FLG170.
(b)Remove bolts, washers, and nuts attaching brackets 145, 150, 155, 160, 165, 170, 175, and 180 to flange FLG173.
(c)Onto the forward side of aft "T" ring (Ref. Fig. 401).
1 Remove four bolts, four washers, four nuts attaching bracket to "T" ring at approximately the 1:30 o'clock position.
2 Remove three bolts, three washers, three nuts attaching bracket to "T" ring at approximately 2 o'clock position.
3 Remove two bolts, two washers, two nuts attaching bracket to "T" ring at approximately 5 o'clock position.
4 Remove two bolts, two washers, two nuts attaching bracket to "T" ring at approximately 6 o'clock position.

(3)Remove brackets from left core as follows :
(a)Remove bolts and washers attaching brackets 5 and 10 to CB202.
(b)Remove bolts, washers, and lockwire attaching brackets 12 and 14 to CB207 and CB211.
(c)Remove bolt and washers attaching bracket 15 to CB221.
(d)Remove bolted, washers, and nuts attaching bracket 20 to heat shield and engine bracket.
(e)Remove bolts, washers, and nuts attaching bracket 25 to duct.

(4)Remove brackets from right core as follows :
(a)Remove bolts, washers, and nuts attaching brackets 30, 35, 40, 45, 50 and 55 to heat shield.
(b)Remove bolts, washers, and lockwire attaching bracket 60 to CB211.
(c)Remove bolts, washers, and lockwire attaching bracket 70 to CB214.
(d)Remove bolts, washers, and lockwire attaching bracket 70 to CB221.
(e)Remove bolts, washers, and attaching bracket 75 to engine bracket.
(f)Remove bolts, washers, and nuts attaching support tube 80 to duct.

(5)Remove brackets from accessory drive gearbox as follows :
(a)Remove bolts and washers attaching bracket 5 to fuel control discharge port.
(b)Remove bolts and washers attaching bracket 10 to fuel/oil heat exchanger tube bracket.
(c)Remove bolts and washers attaching bracket 15 to oil pump port.
(d)Remove bolts and washers attaching brackets to fuel flowmeter.
(e)Remove bolts, washers, and lockwire, attaching bracket 25 to engine core bosses.
(f)Remove screws, washers, and nuts attaching bracket 30 to duct.

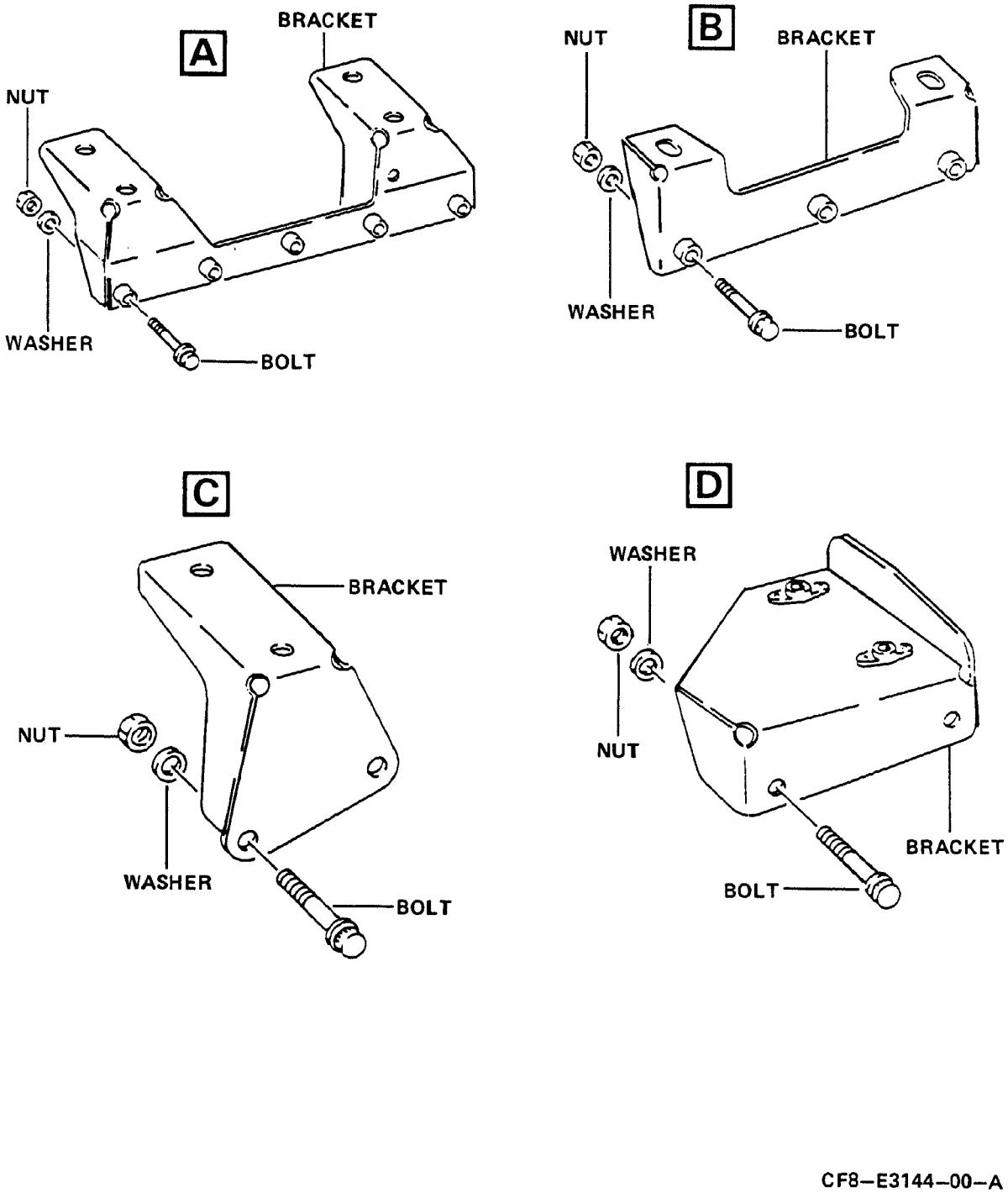
(6)Remove brackets from hydraulic hose, left side as follows :
(a)Remove bolts, washers, and nuts attaching brackets 44, 45, and 50 to ducts.
(b)Remove bolts, washers, and nuts attaching bracket 53 to engine bracket.



BM5 71 40 00 4 LHMA - 28 - 21
DM5

CF8–E3143–00–A

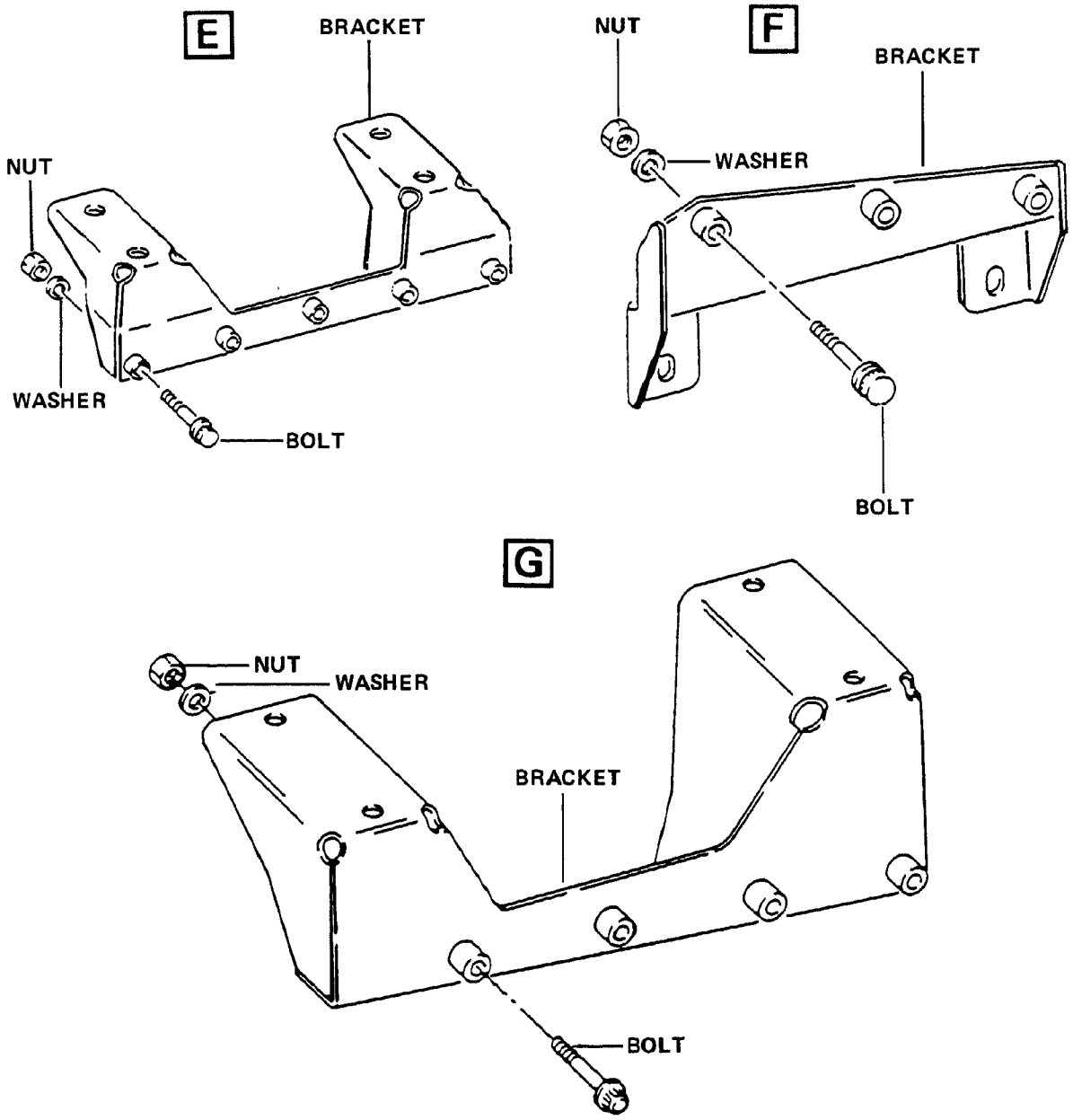
Aft Fan Case "T" Ring Brackets (Sheet 1/3)
Figure 401



BM5 71 40 00 4 LHMC - 28 . 21
DM5

CF8–E3144–00–A

Aft Fan Case "T" Ring Brackets (Sheet 2/3)
Figure 401



BM5 71 40 00 4 LHME - 28 - 21
DM5

CF8–E3145–00–A

Aft Fan Case "T" Ring Brackets (Sheet 3/3)
Figure 401

(c)Remove bolts, washers, and nuts attaching brackets 55, 60, and 65 to ducts.

C. Installation of Brackets

(1)Install brackets on fan case left side as follows :

(a)Install bracket 5 on flange FLG170, holes 16 and 17, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(b)Install bracket 10 on flange FLG170, holes 19 and 20, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(c)Install bracket 25 on flange FLG173, holes 0 and 1, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(d)Install bracket 30 on flange FLG173, holes 3 and 4, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(e)Install bracket 35 on flange FLG173, holes 6 and 7, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(f)Install bracket 40 on flange FLG173, holes 8 and 9, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(g)Install bracket 45 on flange FLG173, holes 10 and 11, facing aft, with bolts, washers, and nuts.TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(h)Install bracket 50 on brackets 40 and 45 with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(i)Install bracket 55 on flange FLG173, holes 23 and 24, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(j)Install bracket 60 on flange FLG178, holes 7 and 8, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(k)Install bracket 65 on flange FLG178, holes 10 and 11, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

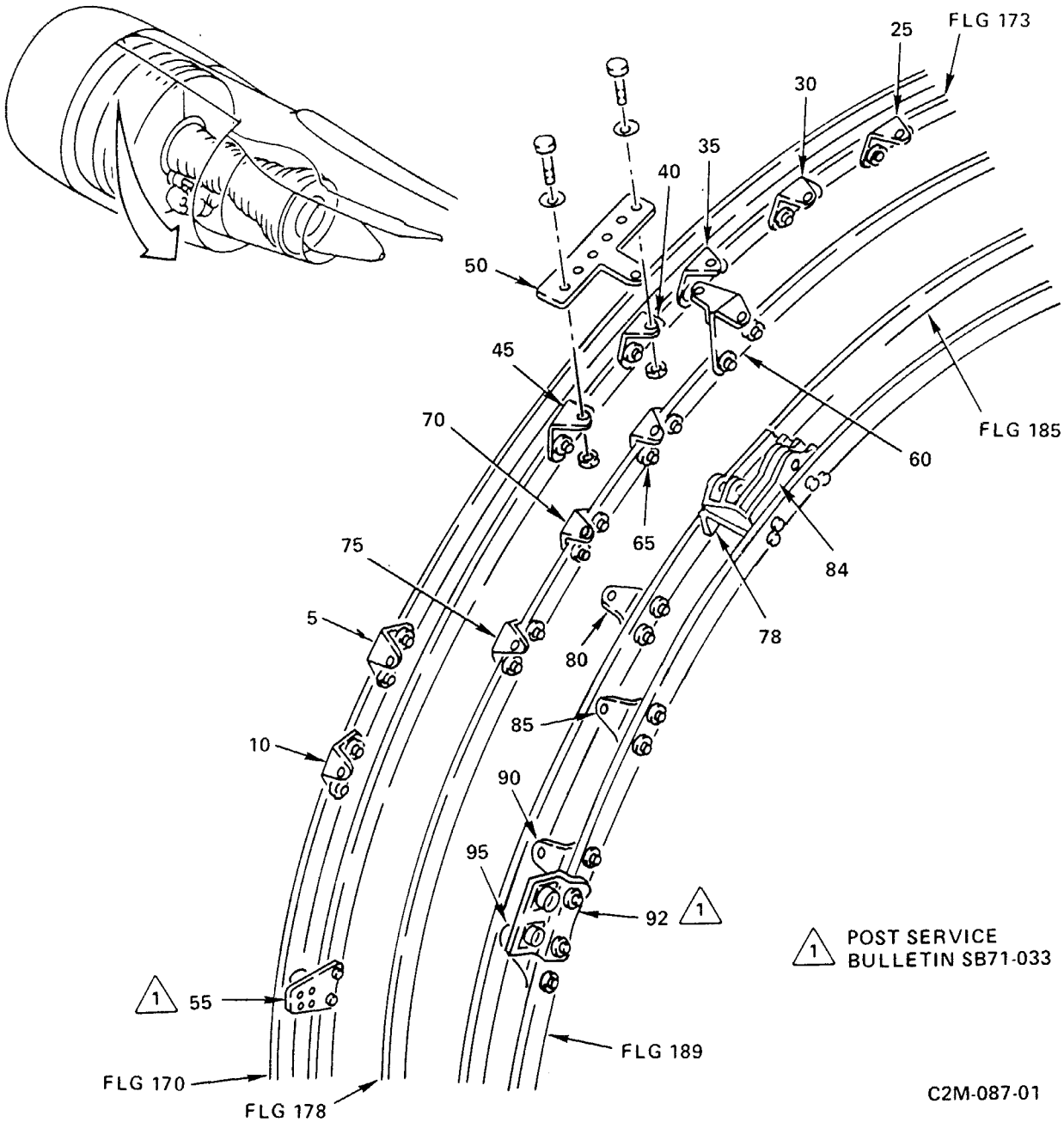
(l)Install bracket 70 on flange FLG178, holes 13 and 14, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(m)Install bracket 75 on flange FLG173, holes 16 and 17, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(n)Install bracket 78 on flange FLG185, holes 8 and 9, facing aft, with bolts, washers, and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 0.79 m.daN).

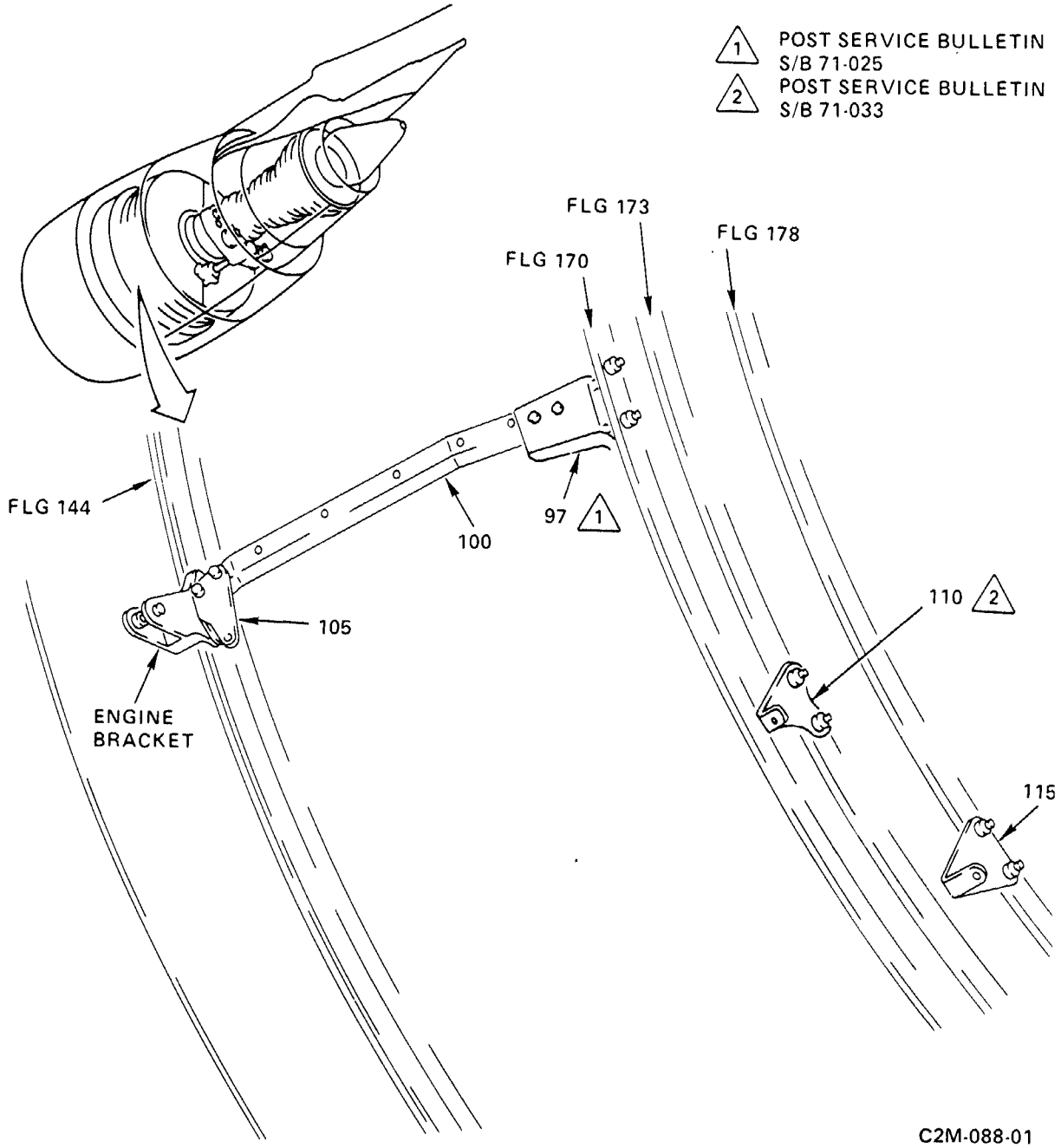
(o)Install bracket 80 on flange FLG185, holes 6 and 7, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(p)Install bracket 84 on flange FLG189, holes 8 and 9, and on bracket 78, facing fwd, with bolts, washers, and nuts. TORQUE nuts to between



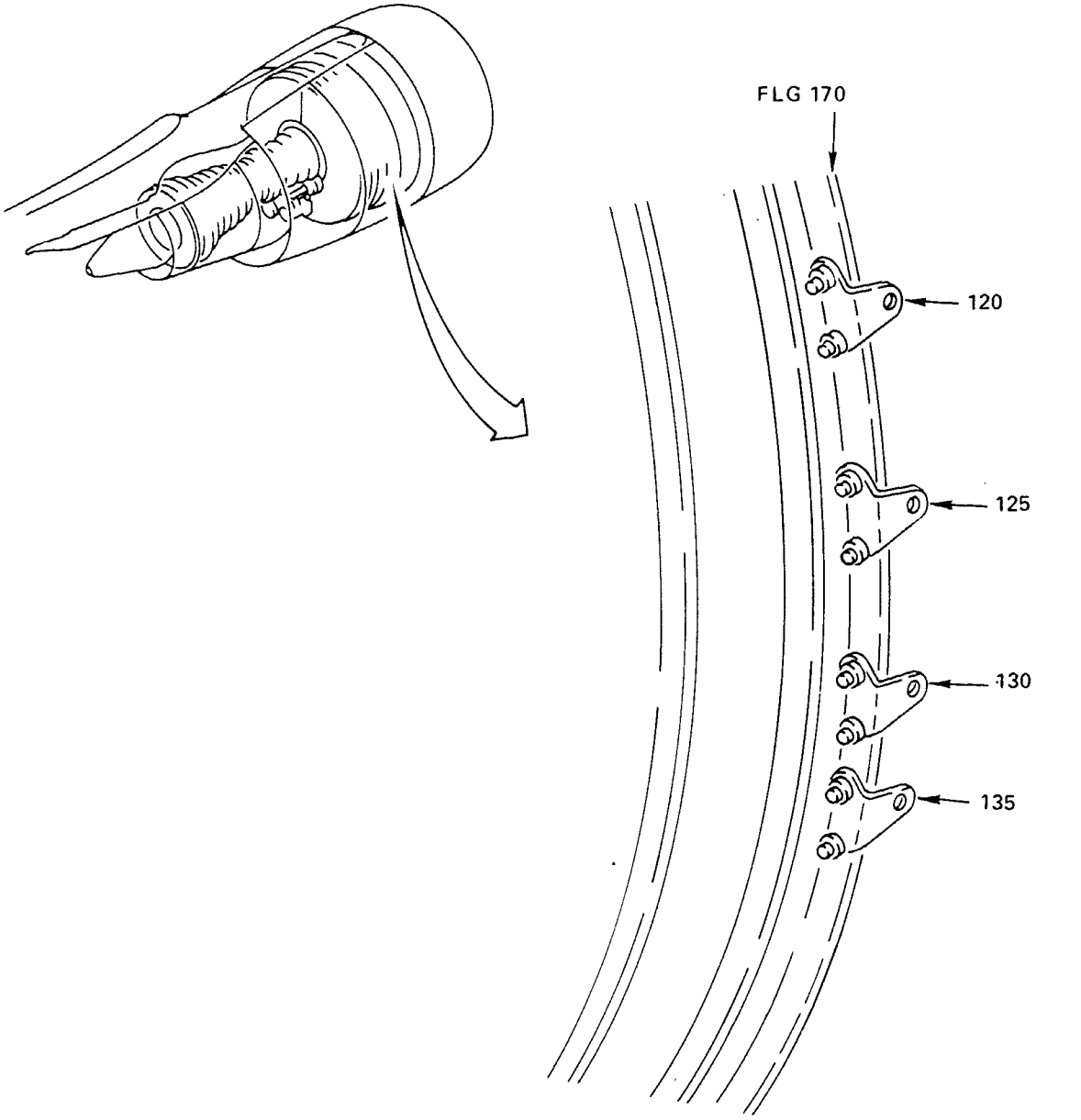
BM5 71 40 00 4 LAMO - 20 - 16
DM5

Brackets, Fan Case, Upper Left Side
Figure 402



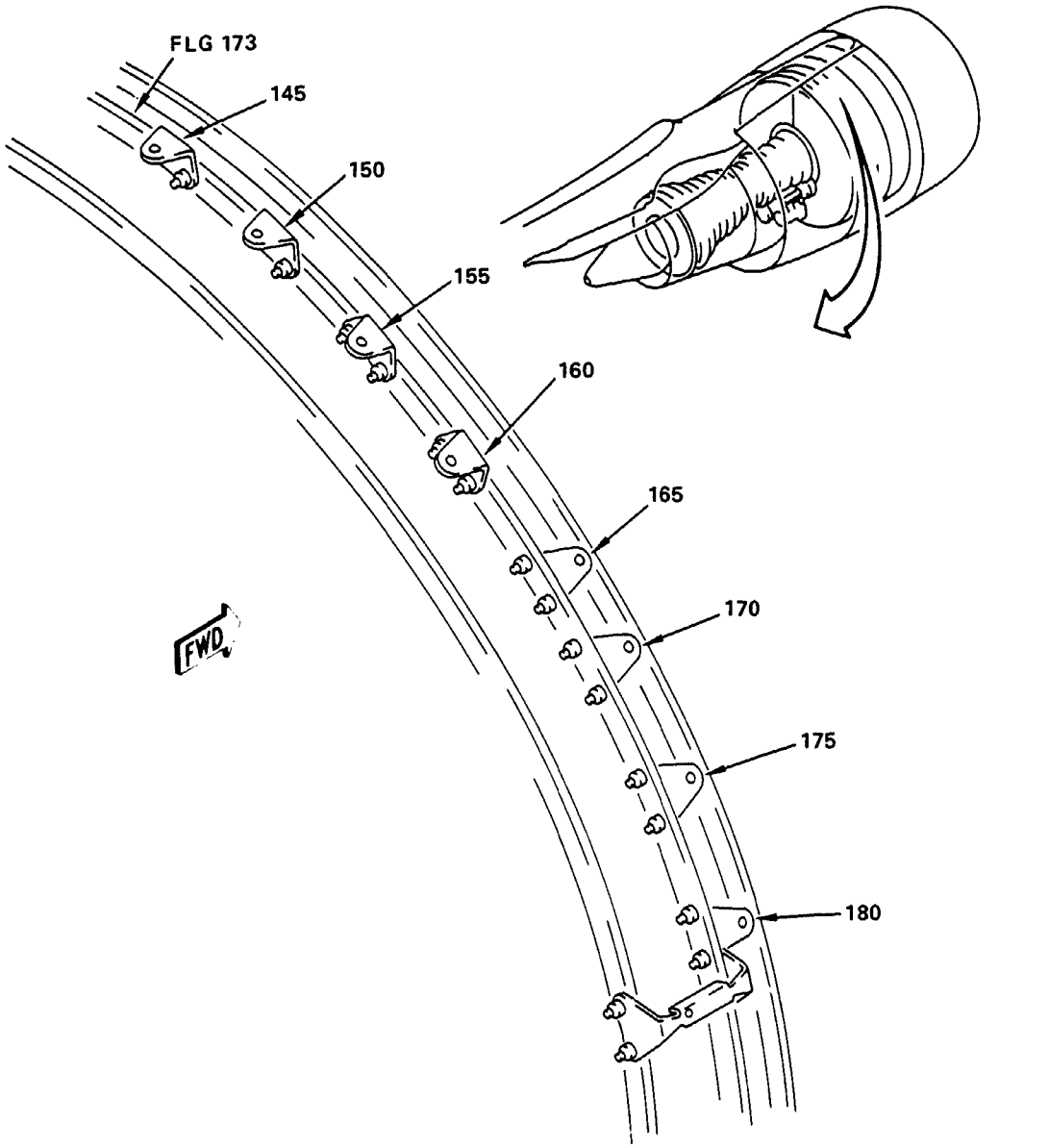
BM5 71 40 00 4 LCMO - 20 - 16
DM5

Brackets, Fan Case, Lower Left Side
Figure 403



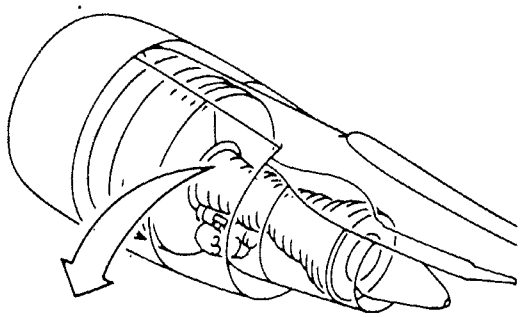
BM5 71 40 00 4 LEMO · 20 · 16
DM5

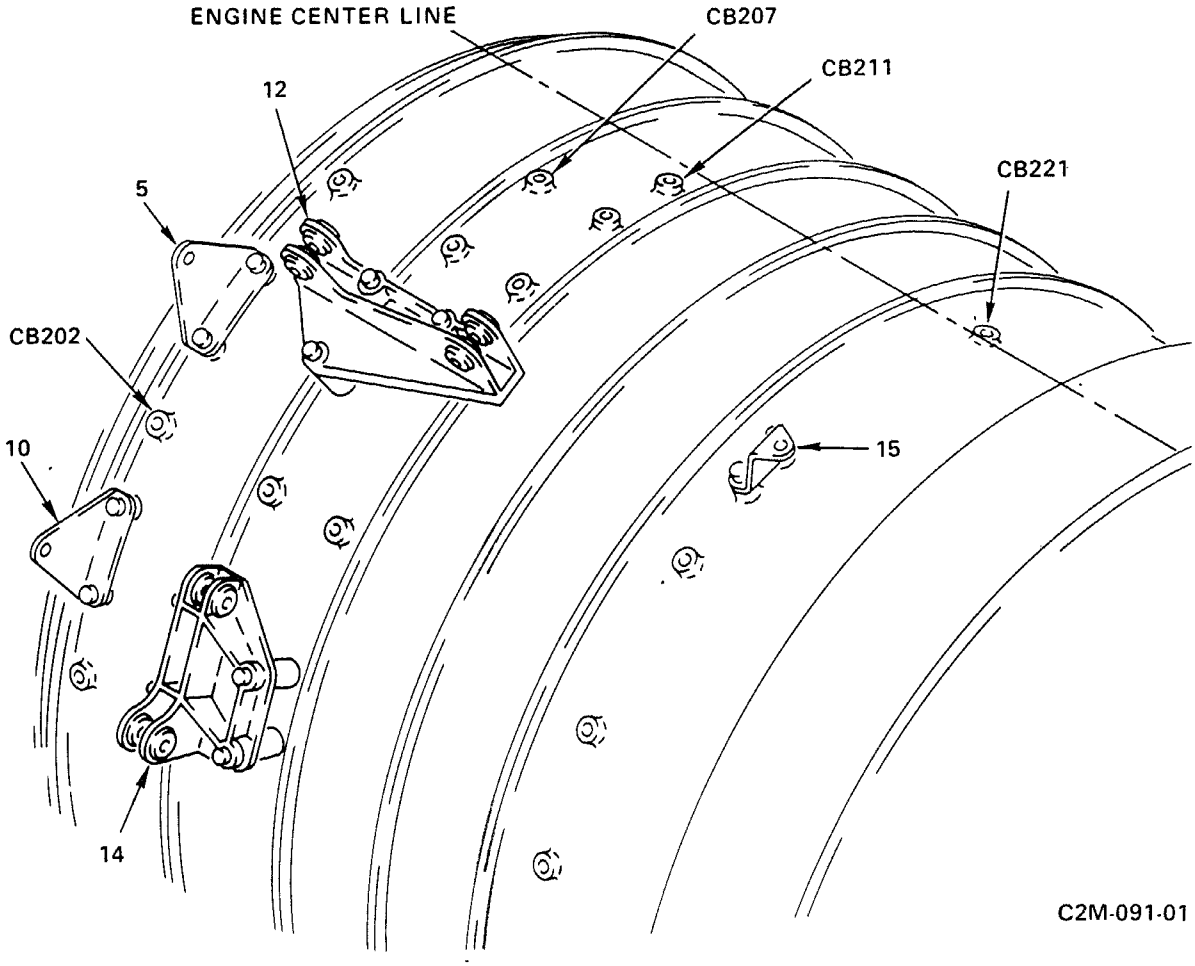
Brackets, Fan Case, Forward Right Side
Figure 404



BM5 71 40 00 4 LGMO - 13 - 08
DM5

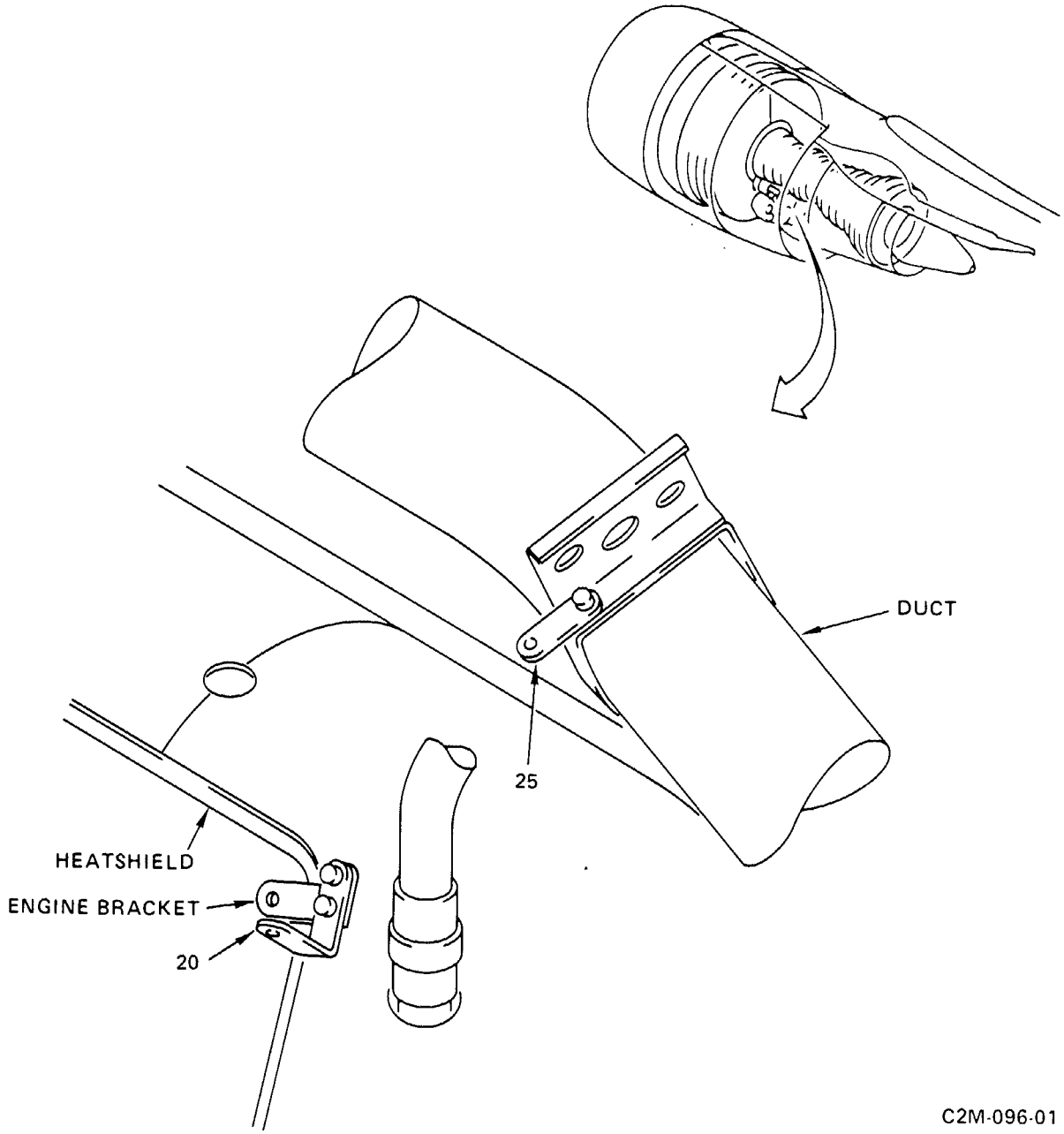
Brackets, Fan Case, Aft Right Side
Figure 405





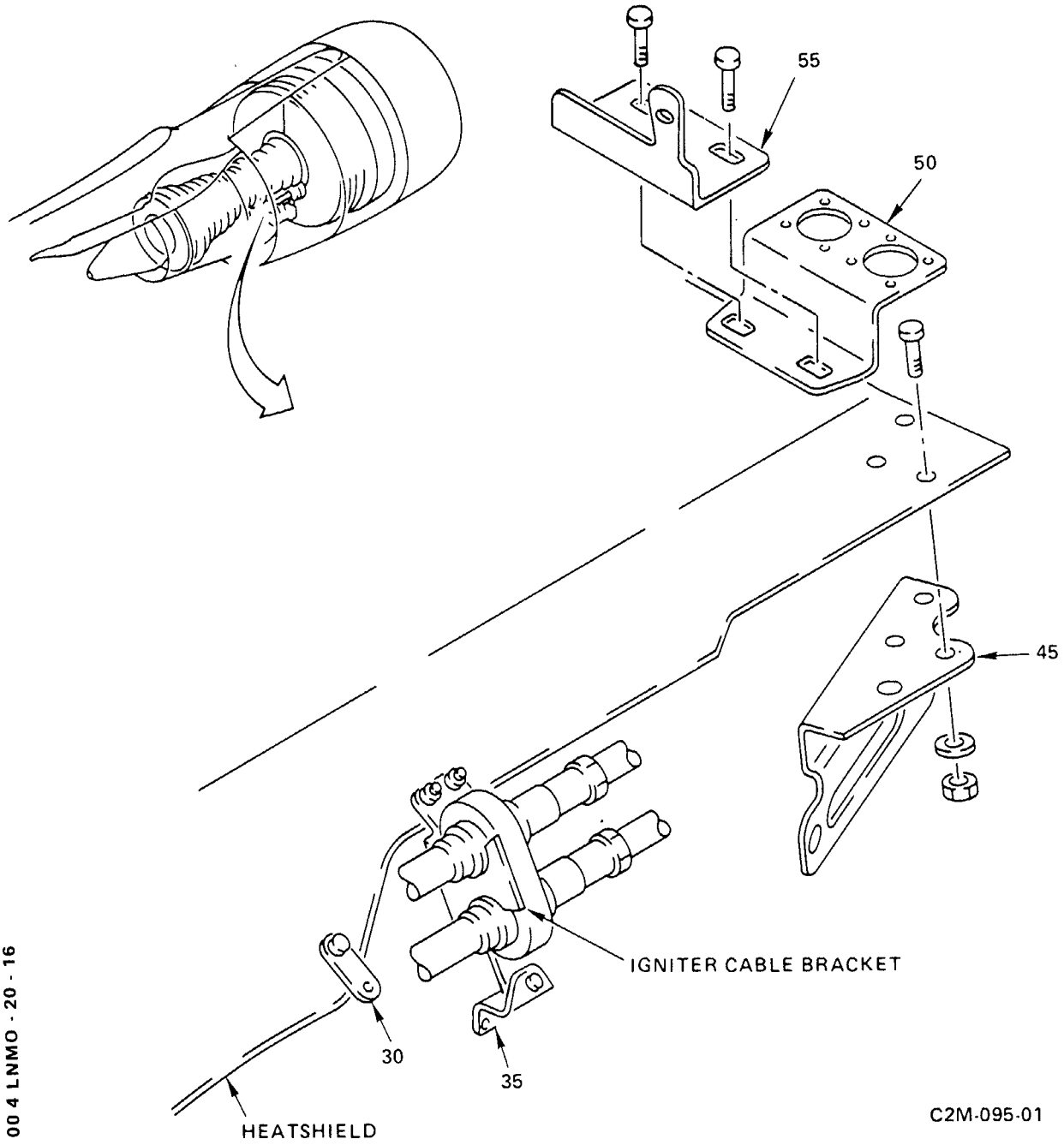
BM5 71 40 00 4 LJMO - 20 - 16
DM5

Brackets, Fan Case, Left Side
Figure 406



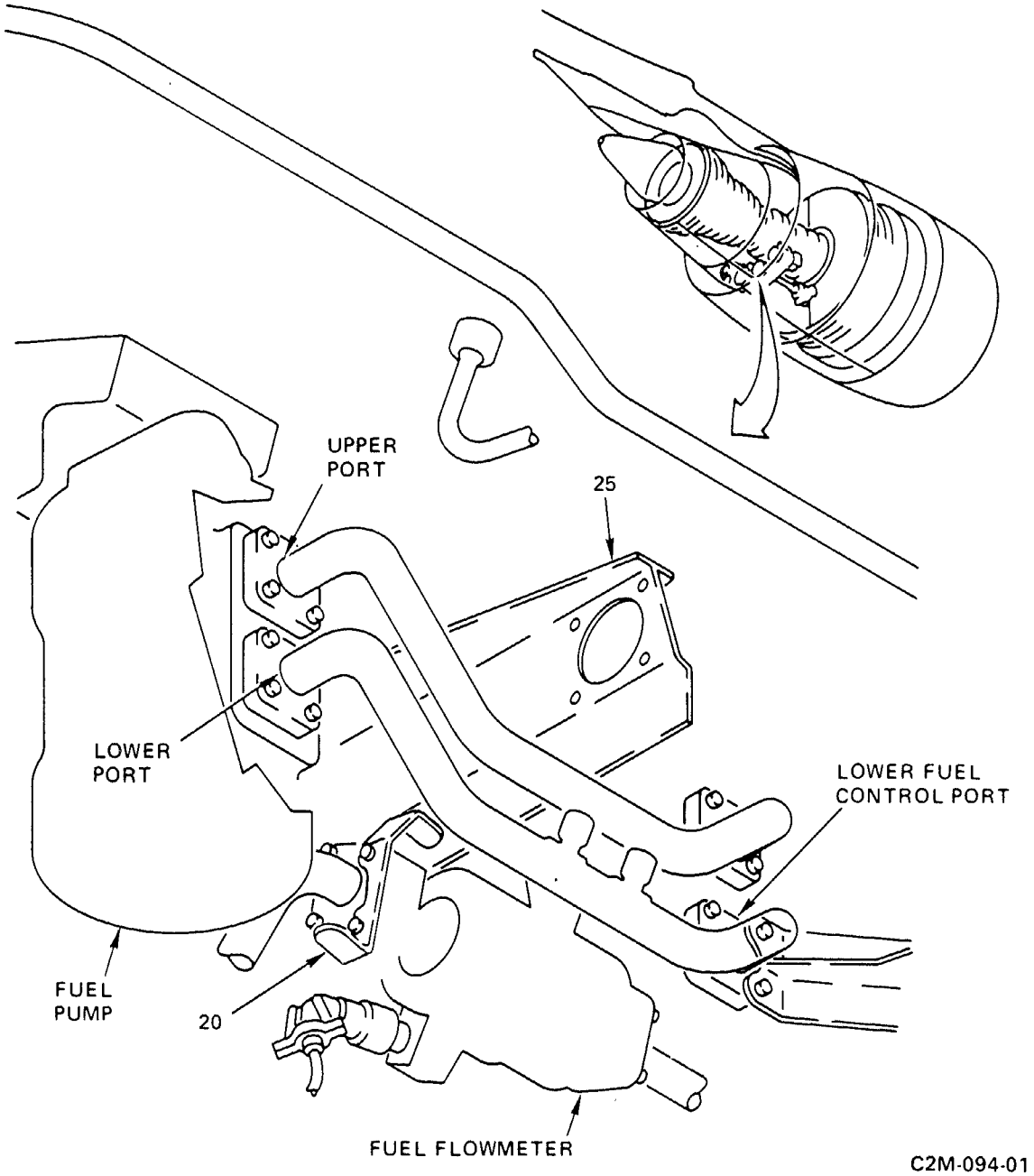
BM5 71 40 00 4 LLMO - 20 - 16
DM5

Brackets, Engine Core, Left Side, Heat Shield
Figure 407



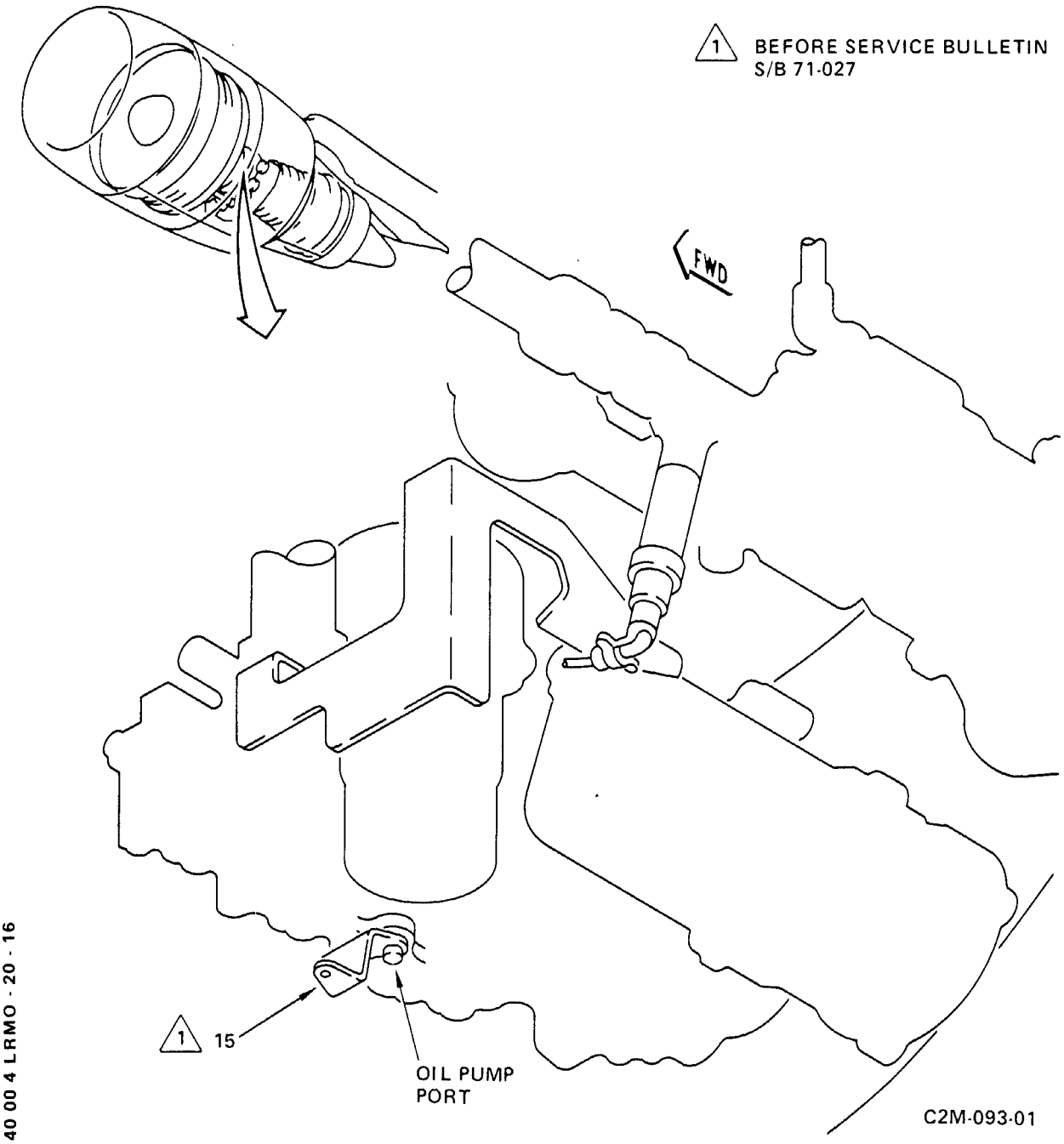
BM5 71 40 00 4 LNMO - 20 - 16
DM5

Brackets, Engine Core, Right Side, Heat Shield
Figure 408



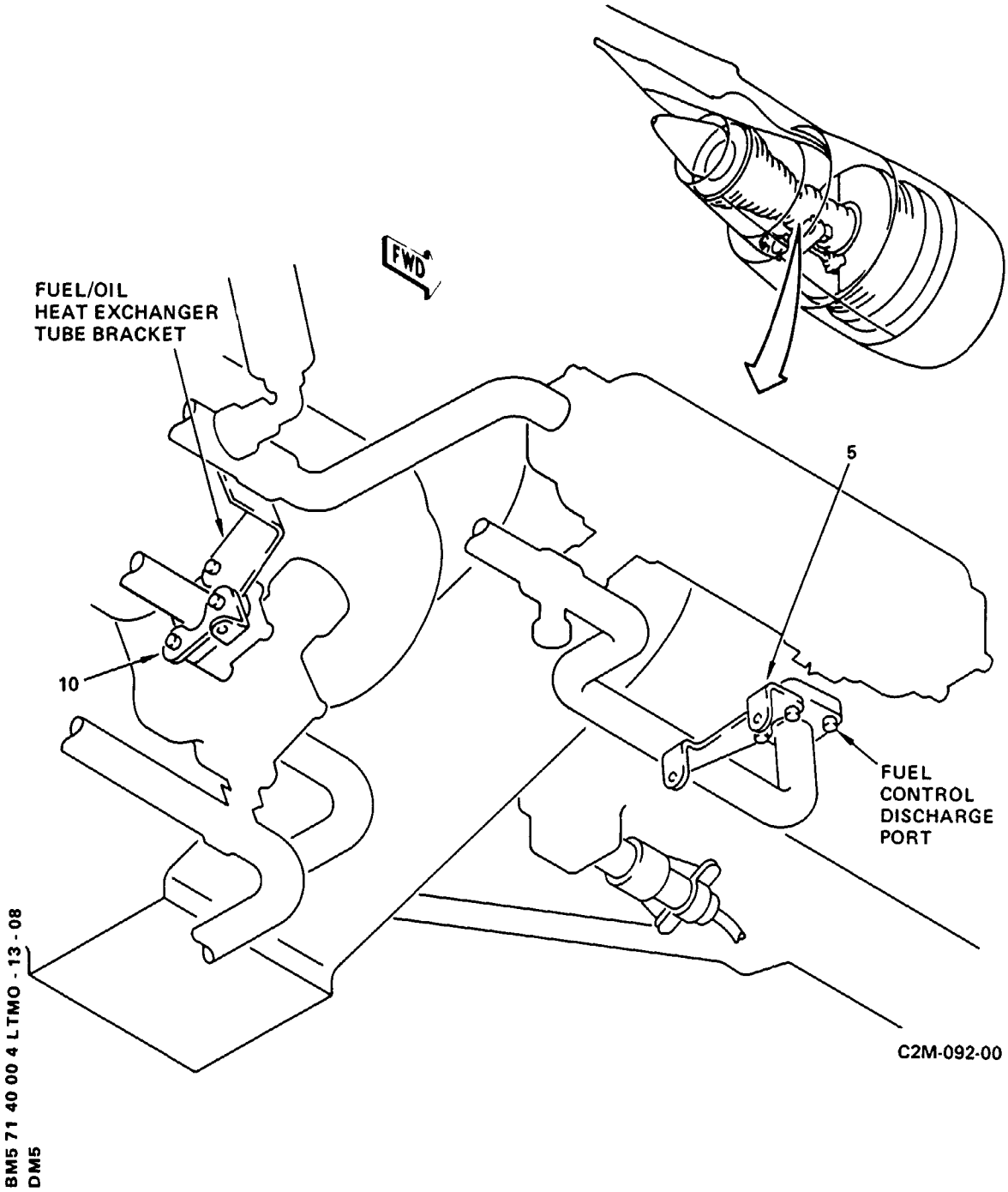
BM5 71 40 00 4 LPMO - 20 - 16
DM5

Brackets, Accessory Drive, Fuel Pump, and Fuel Control
Figure 409

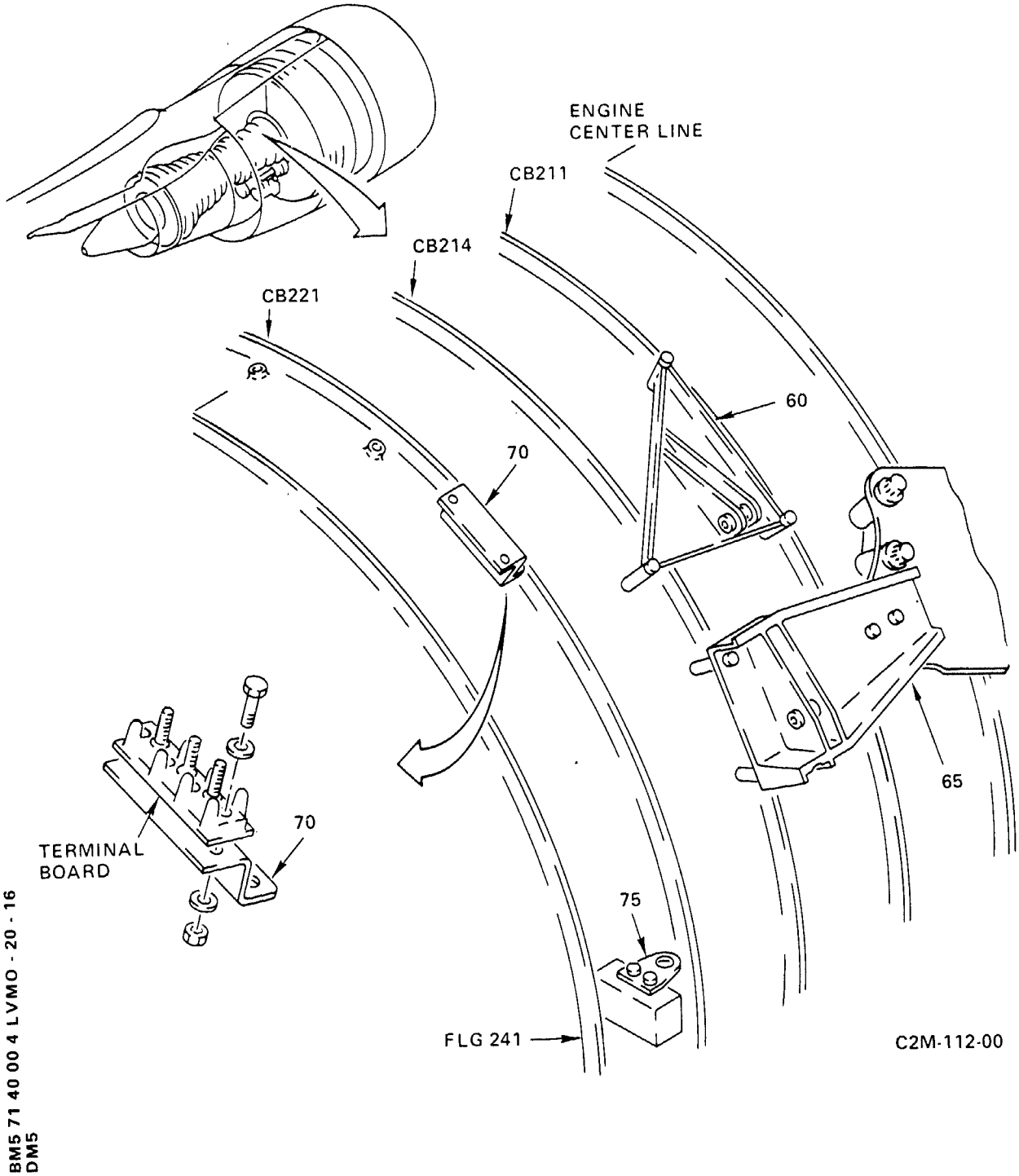


BM5 71 40 00 4 LRMO - 20 - 16
DM5

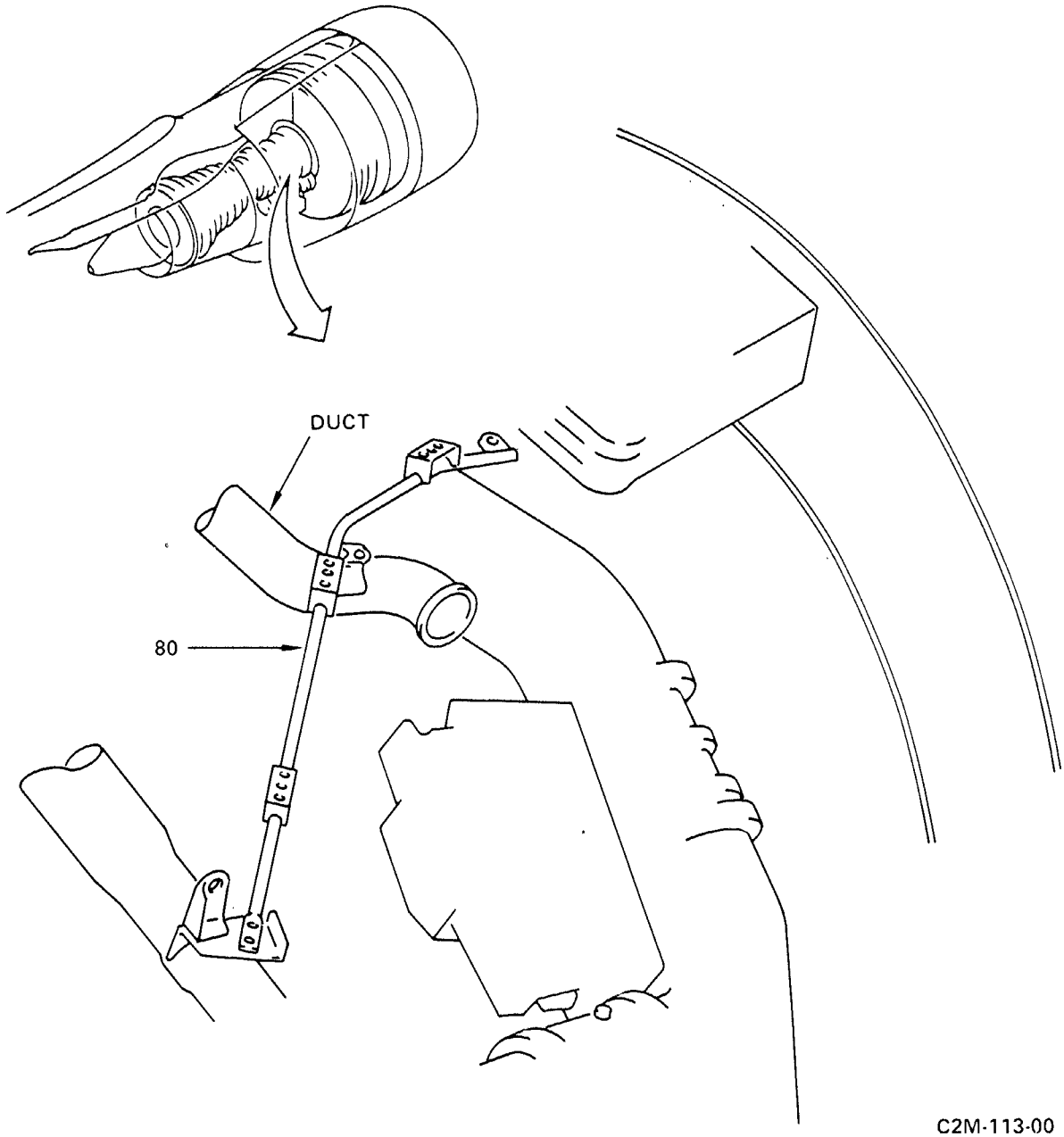
Brackets, Accessory Drive, Oil Pump
Figure 410



Brackets, Accessory Drive, Fuel/Oil Heat Exchanger, Fuel Control
Figure 411

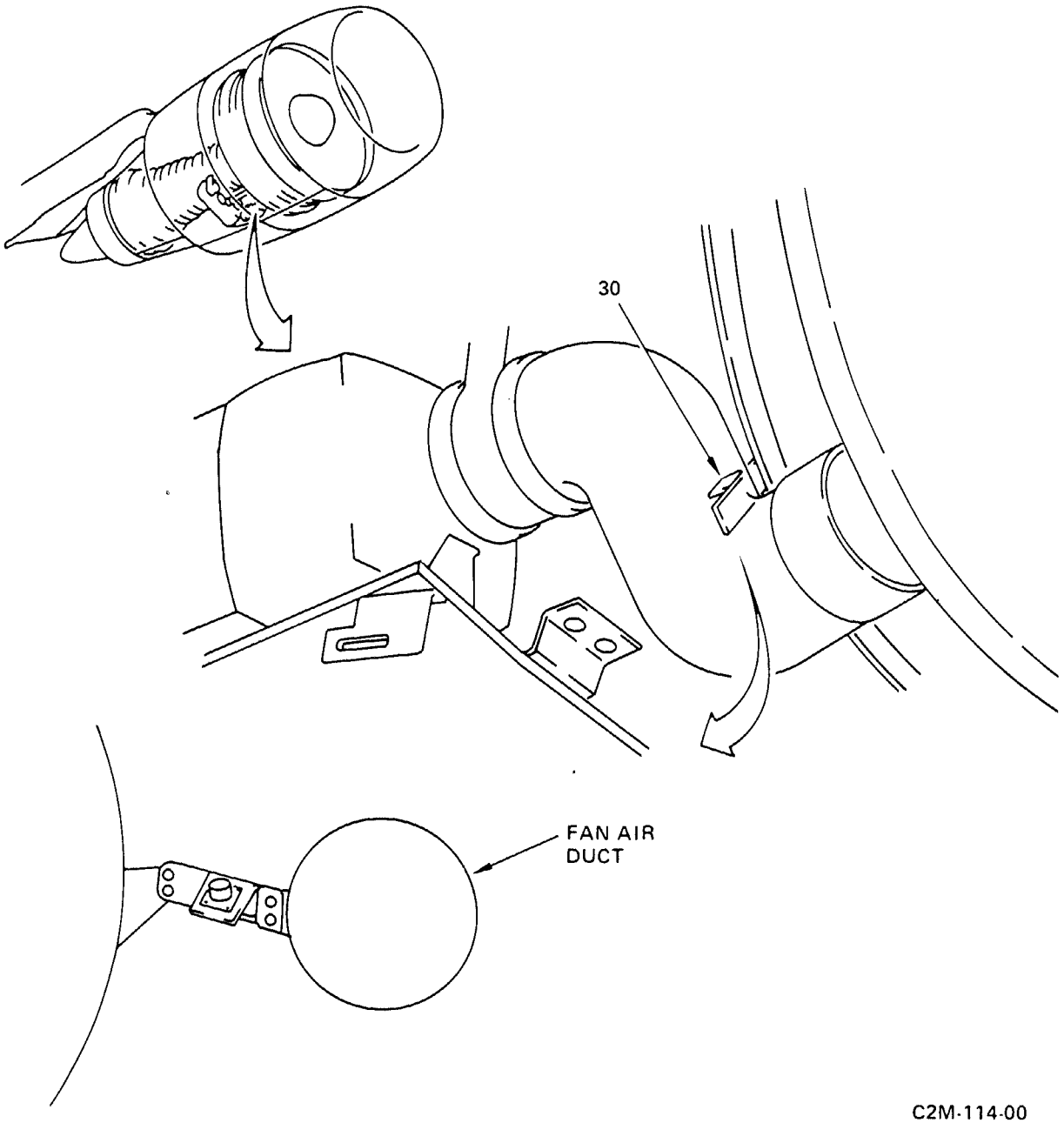


Brackets, Engine Core, Right Side
Figure 412



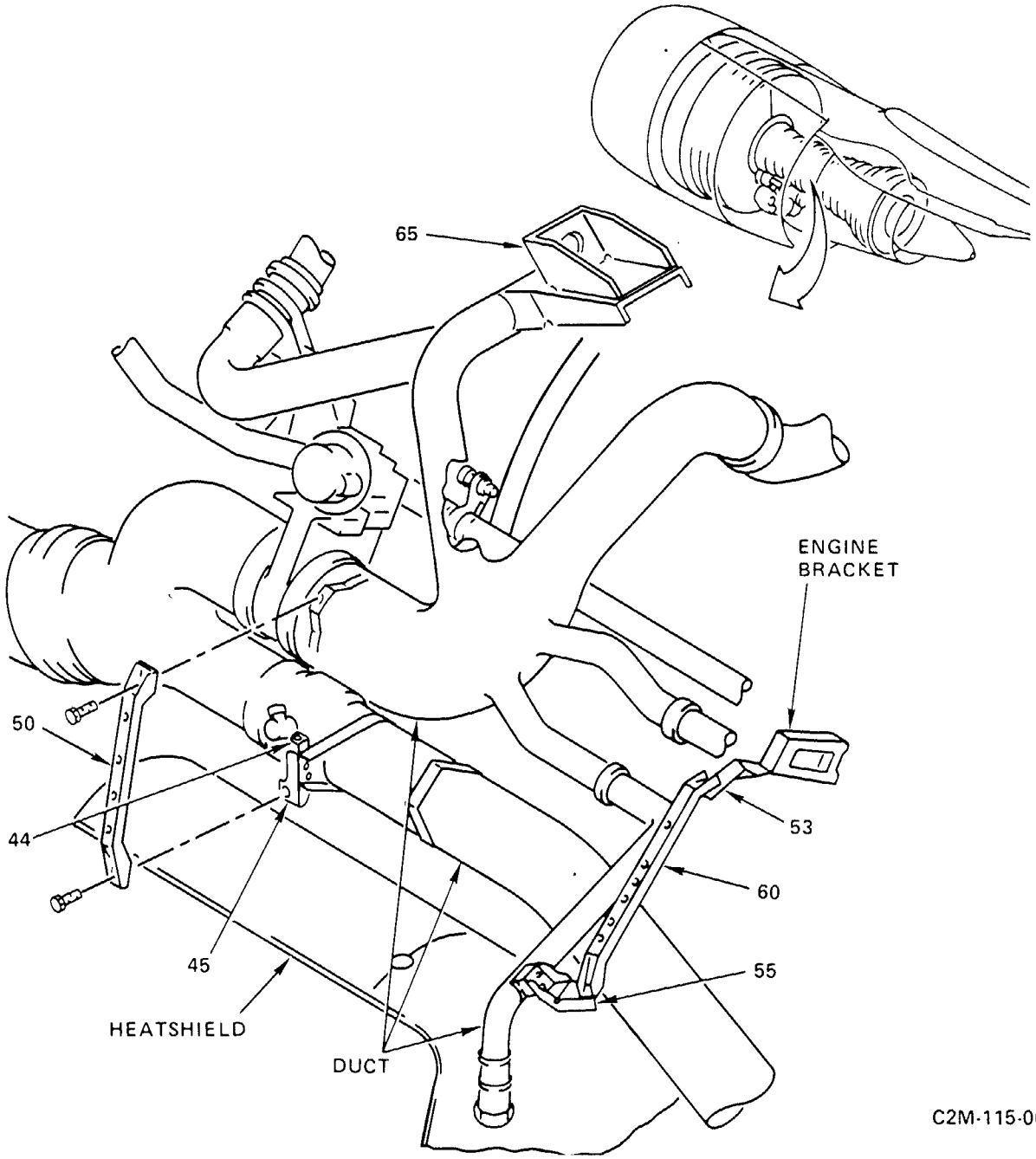
BM5 71 40 00 4 LWMO - 20 - 16
DM5

Support Tube, Engine Core, Right Side
Figure 413



BM5 71 40 00 4 LXMO - 20 - 16
DM5

Bracket, Fan Case, Lower Right Side
Figure 414



BM5 71 40 00 4 LYMO - 20 - 16
DM5

Brackets, Engine Core, Left Side, Heat Shield, Duct
Figure 415

50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(q)Install bracket 85 on flange FLG189, holes 14 and 15, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(r)Install bracket 90 on flange FLG189, holes 16 and 17, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(s)Install bracket 95 on flange FLG189, holes 18 and 19, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(t)Install bracket 92 on flange FLG189, holes 17 and 18, and brackets 90 and 95, facing fwd, with bolts, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(u)Install bracket 97 on flange FLG170, holes 37 and 38, facing fwd, with bolts, washers, and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(v)Install bracket 105 on engine bracket on flange FLG144 facing aft with bolts and washers.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(w)Install channel 100 on brackets 97 and 105, with bolts and washers.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(x)Install bracket 110 on engine bracket on flange FLG173 holes 46 and 47, facing aft, with bolts and washers and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(y)Install bracket 115 on flange FLG178, holes 48 and 49, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(z)Onto the forward side of aft "T" ring (Ref. Fig. 401).

1 Install bore cooling flex bracket onto the forward side of the aft "T" ring at approximately the 6:30 o'clock position, using three bolts, three washers, and three nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).

2 Install bore cooling tube bracket onto the forward side of the aft "T" ring at approximately the 9:30 o'clock position, using three bolts, three washers, and three nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).

3 Install bore cooling bracket onto the forward side of the aft "T" ring at approximately the 10:30 o'clock position, using four bolts, four washers, and four nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).

(2)Install brackets on fan case right side as follows :

(a)Install bracket 120 on flange FLG170, holes 24 and 25, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(b)Install bracket 125 on flange FLG170, holes 26 and 27, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(c)Install bracket 130 on flange FLG170, holes 29 and 30, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(d)Install bracket 135 on flange FLG170, holes 31 and 32, facing fwd, with

bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(e)Install bracket 145 on flange FLG173, holes 2 and 3, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(f)Install bracket 150 on flange FLG173, holes 5 and 6, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(g)Install bracket 155 on flange FLG173, holes 8 and 9, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(h)Install bracket 160 on flange FLG173, holes 11 and 12, facing aft, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(i)Install bracket 165 on flange FLG173, holes 14 and 15, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(j)Install bracket 170 on flange FLG173, holes 16 and 17, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(k)Install bracket 175 on flange FLG173, holes 19 and 20, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(l)Install bracket 180 on flange FLG173, holes 21 and 22, facing fwd, with bolts, washers, and nuts.
TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(m)Onto the forward side of aft "T" ring (Ref. Fig. 401).
1 Install bore cooling bracket onto the forward side of aft "T" ring at approximately the 1:30 o'clock position, using four bolts, four washers, and four nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).
2 Install bore cooling flex bracket onto the forward side of the aft "T" ring at approximately the 2 o'clock position, using three bolts, three washers, three nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).
3 Install bore cooling bracket onto the forward side of the aft "T" ring at approximately the 5 o'clock position, using two bolts, two washers, and two nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).
4 Install bore cooling bracket onto the forward side of the aft "T" ring at approximately the 6 o'clock position, using two bolts, two washers, two nuts. TORQUE nuts to between 24 and 27 lbf.in. (0.27 and 0.30 m.daN).
(3)Install brackets on core left side as follows :
(a)Install bracket 5 on CB202, holes 2 and 3 facing aft, with bolts and lockwire. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN) and wirelock.
(b)Install bracket 10 on CB202, holes 5 and 6 facing aft, with bolts and lockwire.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN) and wirelock.

(c)Install bracket 12 on CB207 and CB211, holes 3 and 4, with bolts, washers, and lockwire. TORQUE bolts to between 50 and 70 lbf.in. (0,56 and 0.79 m.daN).
(d)Install bracket 14 on CB207 and CB211, holes 6 and 7, with bolts, washers, and lockwire. TORQUE bots to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(e)Install bracket 15 on CB221, holes 1 and 2, with bolts and washers. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN) and wirelock.
(f)Install bracket 20 to engine bracket on heat shield with bolts. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(g)Install bracket 25 on duct with bolts. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(4)Install brackets on core right side as follows :
(a)Install bracket 30 on heat shield, hole 9, from aft edge, facing aft with screw, washer, and nut.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(b)Install bracket 35 on heat shield igniter cable bracket with screw, washer, and nut.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(c)Install bracket 45 on forward outboard corner of heat shield with screws, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(d)Install bracket 50 and 55 on forward edge of heat shield with screws, washers,and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(e)Install bracket 60 on CB211, with bolts, washers, and lockwire.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(f)Install bracket 65 on CB214, with bolts, washers, nuts, and lockwire.
TORQUE bolts and nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(g)Install bracket 70 on CB221, holes 2 and 3, with bolts, washers, and lockwire. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(h)Install bracket 75 on engine bracket, with bolts, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(i)Install support tube 80 on duct, with screws, washers, and nuts.
TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(5)Install brackets on accessory drive gearbox as follows :
(a)Installbracket 5 on fuel control discharge port aft holes with bolts.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(b)Install bracket 10 on fuel/oil heat exchanger, lower holes, with bolts and nuts.TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(c)Install bracket 15 on oil pump port, forward holes, with bolts.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(d)Install bracket 20 on fuel flowmeter aft holes, with bolts.
TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(e)Install bracket 25 on engine core bosses, with bolts, washers, and lockwire. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(f)Install bracket 30 on duct, with screws, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(6)Install brackets on hydraulic hose, left side as follows :

(a)Install brackets 44 and 45 on duct, with bolts, washers and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(b)Install bracket 50 on duct and bracket 45, with bolts, washers and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(c)Install bracket 53 on engine bracket, with bolts, washers and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(d)Install bracket 55 on duct, with bolts, washers and nuts. TORQUE nuts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(e)Install bracket 60 on brackets 53 and 55.

(f)Install bracket 65 on duct, with bolts, washers, and nuts. TORQUE nuts to between 160 and 190 lbf.in. (18.08 and 21.47 m.daN).

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

ELECTRICAL HARNESS - DESCRIPTION AND OPERATION

1. General

The electrical system distributes the power required by the aircraft and engine components in order to supply :

- the control signals
- the indicating signals
- the transmission of electrical signals provided by various sensors
- conduct electrical power from the engine-mounted generator to the aircraft distribution system.

Harnesses are provided between the engine and pylon in both fan and core compartments. Other harnesses are routed through the lower fireseal to interconnect engine equipment in core and fan compartments.

2. Description (Ref. Fig. 001, 002)

A. Fan Harness

The fan harness provides electrical power to the equipment located on the fan case, and transmits signals to and from monitoring circuits of the following systems, thru the fan junction box

- Oil quantity transmitter and oil filter differential pressure switch
- Engine ignition exciters "A" and "B"
- Fan (N1) and core (N2) speed indicating system.
- Core vent temperature sensor (from the reverser harness)
- Power management control (PMC)
- Propulsion multiplexer (PMUX) (optional)
- The nacelle inlet interphone jack

The reverser operating system is directly wired to (2) fan reverser junction boxes, on either side of the engine

B. Core Harnesses (Left and Right Sides)

The core harness transmits power to and from electrical equipment and allows transmission of monitoring signals thru the core junction box as follows :

- The fan and core vibration accelerometers
- The Beta angle transmitter (for compressor variable stator vane setting on the ground)
- The fire sensing elements
- The exhaust gas temperature (thermocouple) sensor
- The nose cowl anti-icing air valve
- Integrated -Drive-Generator control leads
- IDG oil cooling air valve
- The thrust reverser air supply valve
- Cooling air valves position switches
- ECS pneumatic bleed air regulator valve
- ECS high pressure shutoff valve

C. Other Harnesses

(1) An accessory gearbox harness is provided to connect electrical circuits to equipment mounted around the accessory gearbox. This harness simplifies engine installation and maintenance by consolidating to one

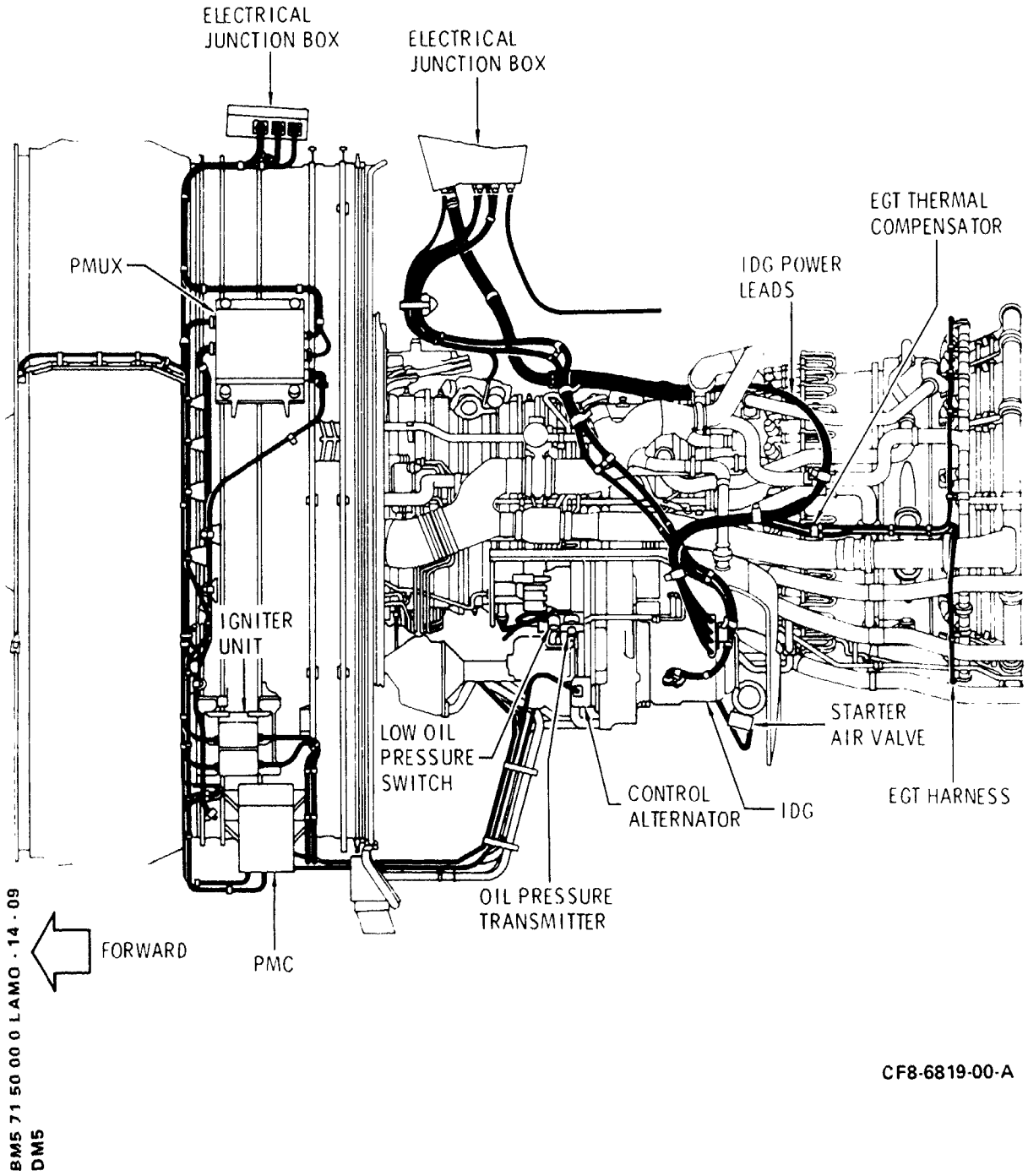
location the separate leads to several components beneath the heat shield. This harness connects the following equipment :
- The main engine fuel control
- Fuel system monitoring sensors (including fuel flow meter pressure transmitter and filter differential pressure switch)
- Oil system monitoring sensors (including pressure transmitter and low oil pressure switch and oil temperature sensor)
- Hydraulic pump valves
- Starter air shut-off valve

(2) Electrical power cable harness assembly. Engine and condition monitoring electrical harnesses between equipment in the core and fan compartments are routed via the lower fireseal for the following :
- Compressor inlet temperature (PMUX, optional)
- Compressor discharge temperature (PMUX, optional)
- Variable stator vane position (PMUX, optional)
- Variable bleed valve position (PMUX, optional)

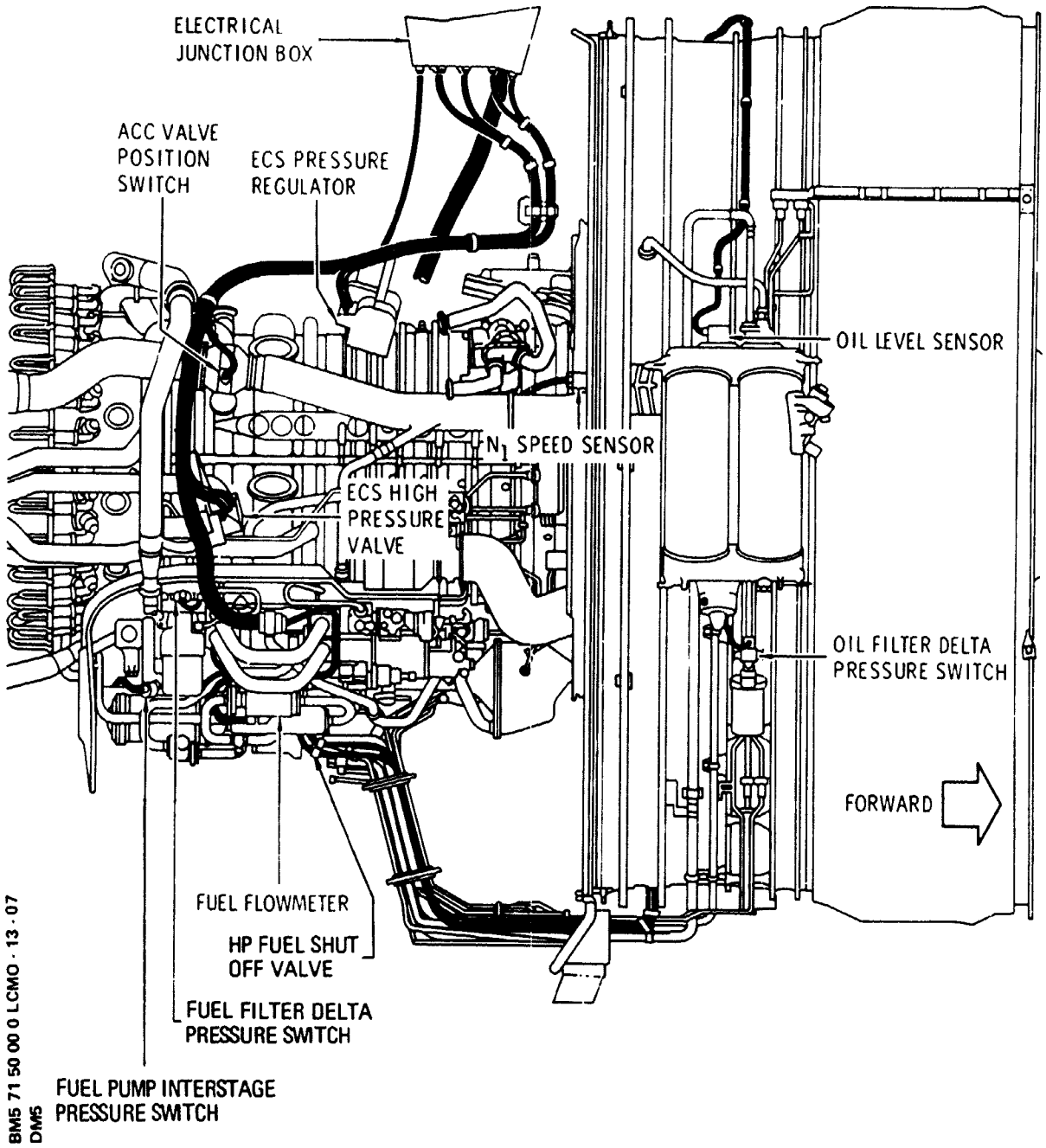
Fuel flow rate (PMUX, optional)
- H.P. turbine discharge pressure (PMUX, optional)
- Low pressure turbine discharge temperature (PMUX, optional)
- PMC power supply
- Fan (N1) and core (N2) speed indicating signals
- PMC/MEC N1 servo resolver control loop signals
- Blocker door variable bleed valve position (PMUX, optional)

D. Attachment and Connection

The harnesses and cables are routed around the engine periphery and are attached to brackets by means of clips and clamps.
The harness connectors connect to the components at the lower end. At the upper end, the harness connects to the aircraft junction boxes attached to the under side of the pylon. There is a core and a fan junction box.



Electrical Harness LH
Figure 001



Electrical Harness RH
Figure 002

ELECTRICAL HARNESS - APPROVED REPAIRS

1. General

This procedure provides replacement instructions for an individual wire in a wire harness installed on an engine.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Tape, 190L0F21G
B.	Tape, Scotch 361
C.	Tape, Tie, MIL-T-43435
D.	Tape, High Temperature Insulating, RL6000SA
E.	Corrosion Resistant Steel Lockwire, MS20995N20 (Ref. 70-00-00)
F. Material No.C04-035	Cleaning Compounds and Solvents (Ref. 70-00-00)

R

3. Wire Replacement

A. Place one end of bulk wire of the appropriate type and gage six in. (152 mm) past the end of the electrical connector with the broken wire.

B. Tape wire to the connector.

C. Route wire along wire harness up to electrical connector at the other end broken wire.

D. Extend wire six in. (152 mm) beyond electrical connector and cut wire.

E. Stamp new wire with the same identification number that the old wire had.

F. Route new wire under clamps attaching wire harness to engine.

G. Remove backshell and strain relief clamp from each electrical connector. Remove tape under clamp from wire harness.

H. Remove the contacts of the broken wire from both connectors with the
R appropriate front or rear release removal tool.

I. Cut the contacts from broken wire and discard contacts

J. Crimp new contacts to new wire.

K. Install contacts in electrical connectors using the appropriate front or
R rear release installation tool.

L. Install the backshells on the electrical connectors. Tighten backshells fingertight plus one fourth turn.

M. Wrap wire bundle under strain relief clamps with Scotch 361 silicone glass cloth tape. Install strain relief clamps with screws and wirelock with MS20995N20 lockwire.

N. Replace any ties on wire harness that were removed to gain access to wires with 190L0F21G tape.

O. Check continuity of new wire between connectors.

4. Inspection/Check of Electrical Harness

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Spring Scale or Fabricated Four Ounce (113.4 g) Weight
(2)	Test Pin (Locally Manufactured)

B. Procedure

NOTE : The limits presented in the following table are general in nature and are not intended to supersede limits on specified components covered elsewhere in this manual.

Inspect/Check	Maximum Serviceable Limits	Maximum Repairable Limits	Repair Methods
(1) Broken Wires, short circuit, or open circuit	Not serviceable	(Ref. Para. 6.)	(Ref. Para. 6.)
(2) Broken terminal, wire broken at terminal	Not serviceable	Three reterminations per wire allowed	Reterminate wire
(3) Damaged insulation	Insulation resistance must be greater than 1000 MΩ at 100 Vdc	Repair not available	Replace wire
(4) Damaged connector shell or inserts	Not serviceable	Repair not available	Replace Connector
(5) Damaged connector threads	Damage can not be more than 50% of any single thread	Repair not available	Replace Connector

Inspect/Check	Maximum Serviceable Limits	Maximum Repairable Limits	Repair Methods
	or 10% of two threads		
(6) Low contact pressure of female receptacle	See paragraph 5.	Repair not available	Replace Connector

5. Do a Connector Contact Tension Test (Ref. Fig. 801)

A. Examine the Spring Tension of Female Contacts in Connectors as Follows :
(1)Insert pin into contact.
(2)Pull pin straight out with spring scale.
(3)Replace the connector if less than 1.5 Oz (43 g) of force is necessary to pull out a No. 16 pin. Also, replace the connector if 0.6 Oz (17 g) of force is necessary to pull out a No. 20 pin.
NOTE : If a spring scale is not available, a fabricated 1.5 Oz (43 g) weight and a 0.6 Oz (17 g) weight can be used.

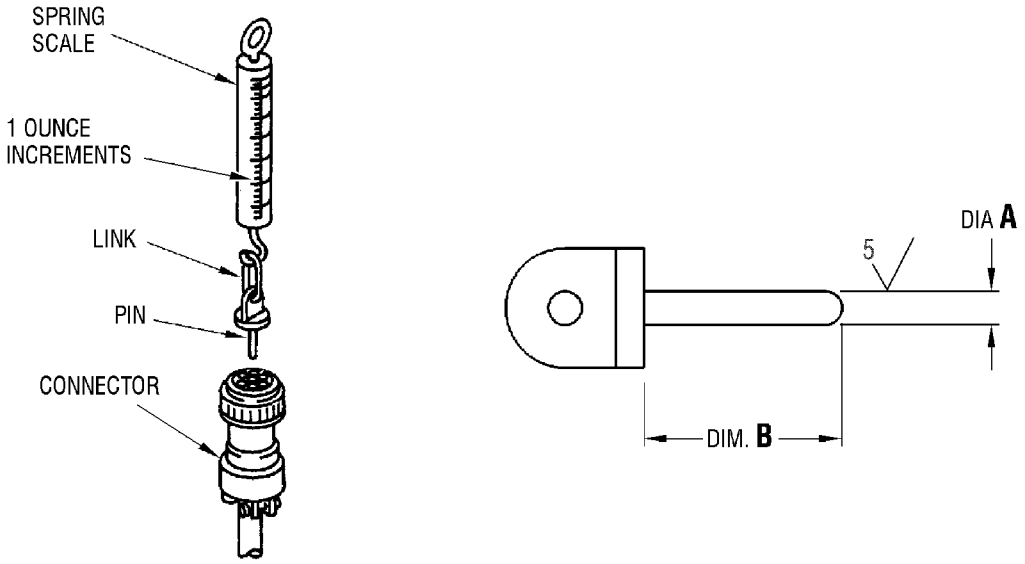
6. Wire Splice Repair

A. General
Wires or wire bundles which cannot be repaired in the limits given in this procedure must be replaced.
Wire splice repairs are considered permitted temporary repairs. The defective wire or wires must be replaced the next time the wire harness is removed from the engine.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Crimping Tool, Y14MV
(2)	Splice, YSV16
(3)	Splice, YSV18
(4)	Heat Shrink Tubing, WTF1206A-1
(5)	Tape, RL6000SA
(6)	Tape, 190L0F21G

C. Wire Harness Repair Limits
(1)Splices may not be closer than 6 in. (152.4 mm) to a connector backshell.
(2)Maximum of one splice per wire is allowed.
(3)Maximum of three splices per wire bundle are allowed.
(4)Splices may not be located under clamps or in drip loops.
(5)Splices must be offset from each other at least 0.12 in. (3 mm) when splicing more than one wire in a bundle. (Ref. Fig. 802)



TEST PIN CAN BE MADE LOCALLY
MATERIAL: STAINLESS STEEL (Rc 40-45)

PIN SIZE	DIA **A** +0.0001 (0.003) - 0.0000 (0.000)	DIM. **B** MIN	MIN FORCE
16	0.0615 (1.562)	0.469 (11.913)	1.5 OZ (0.4 N)
20	0.0390 (0.991)	0.469 (11.913)	0.6 OZ (0.2 N)

NOTE:
DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1209187-02

BM5 71 50 00 8 LAM0 02

R

Pin Pull Test for Electrical Connectors
Figure 801

(6)Splicing of wires in the following critical circuits is prohibited :
(a)Generator power feeders and control circuits.
(b)Fuel condition control motor actuator circuit.
(c)Engine oil quantity indicating system.
(d)Engine fire detection system.
(e)Fuel shutoff valve circuit.
(f)Pressure regulator valve circuit.
(g)Hydraulic pump solenoid circuit.

D. Single Wire Unshielded Splice Repair
(1)Remove red tape from wire harness to gain access to damaged wire.
(2)Cut damaged wire and strip enough insulation to insert wire into splice, with 0.12 in. (3 mm) maximum between end of splice and insulation. (Ref. Fig. 803)
(3)Cut heat-shrink sleeve to extend at least 0.75 in. (19 mm) beyond the end of the wire insulation on both sides of splice. Add 10 percent extra length to compensate for shrinkage. (Ref. Fig. 804)
(4)Slide sleeve over wire.
(5)Select the correct size splice for wire size that is to be repaired.
YSV16 - 16 gage wire
YSV18 - 18 gage wire.
(6)Put one end of the wire into splice and crimp the splice.
(7)Pull on wire to make sure that the splice firmly holds the wire.
(8)Repeat steps (6) and (7) for the other end of the wire.
WARNING : FUEL OR FUEL VAPOR EXPLOSION MAY CAUSE INJURY OR DEATH. DO NOT USE HEAT GUNS WHERE FUEL OR FUEL VAPOR IS PRESENT. HEAT GUNS ARE A SOURCE OF COMBUSTION.
WARNING : BREATHING OF FUMES RELEASED FROM WTF HEAT SHRINK SLEEVES DURING THE SHRINKING PROCESS MAY CAUSE INJURY. HEAT SHRINKING OF WTF SLEEVES SHOULD BE DONE UNDER A VENTILATION HOOD OR IN A FORCED AIR DRAFT.
(9)Center sleeve over wire splice and shrink into place as follows : (Ref. Fig. 804)
(a)Attach heat reflector to heat gun. See Wiring Manual Ref. 20-27-00, Heat Guns for installation of Shrink Sleeve.
(b)Shape contour of heat reflector to allow approximately 1 in. (25.4 mm) between reflector and wire. (Ref. Fig. 805)
(c)Protect all nearby wires and other items that could be damaged by heat with suitable heat shields.
(d)Preheat heat gun for 15 seconds.
(e)Apply heat to sleeve and shrink into place.
1 Do not exceed 20 seconds heating.
2 If sleeve is not properly shrunk after 20 seconds, allow wire assembly to cool for at least 5 minutes before applying heat to sleeve again.
(10)Wrap harness splice area with red silicone fiberglass tape.
(a)Pull ends of wrap tight and tie with tying tape.
(b)Make sure that the tape wrap extends at least two inches onto the harness on both sides of the splice.
(c)Overlap each tap wrap 50 percent onto the previous wrap.
(d)Wrap harness again in the opposite direction.
(e)Tie each end of wrap with tying tape.

(11)Do a functional test of the repaired circuit.

7. Wire Harness Repair - Limited Rewrap (Ref. Fig. 806)

A. Cut Damaged Wrap from Harness
WARNING : ISOPROPYL ALCOHOL IS A DANGEROUS MATERIAL WHICH MAY CAUSE INJURY OR ILLNESS IF NOT CORRECTLY USED. THIS MATERIAL SHOULD BE USED ONLY ACCORDING TO THE MANUFACTURER'S SPECIFIC SAFETY AND HEALTH INSTRUCTIONS. BEFORE USING THIS MATERIAL, CAREFULLY READ THE APPLICABLE "MATERIAL SAFETY DATA SHEET" AND FOLLOW ALL LISTED SAFETY INSTRUCTIONS.

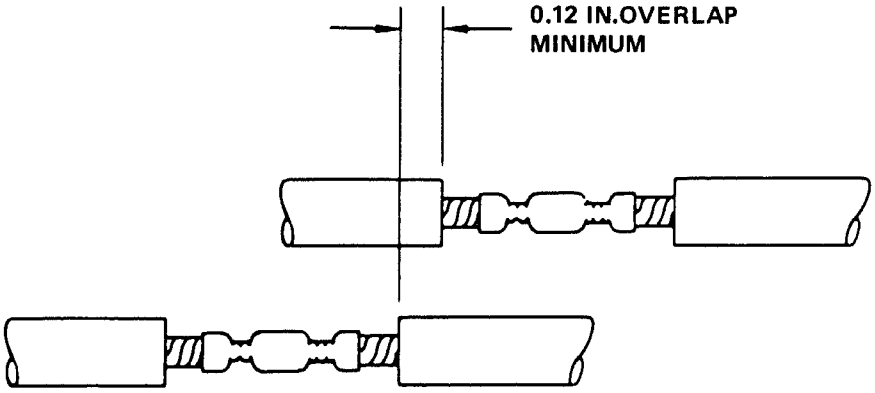
B. Clean the harness with a cloth moist with isopropyl alcohol (C04-035).

C. Wipe the harness dry before the alcohol evaporates.

D. Pull the ends of the original wrap tight and tie with tie tape.

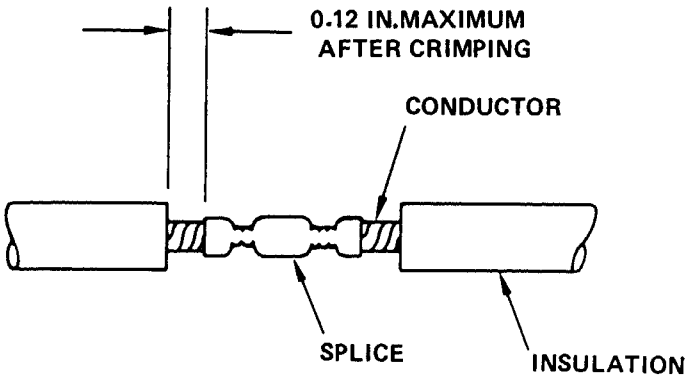
E. Wrap harness as follows : Make certain you wrap tight enough to make a moisture-proof seal.
(1)Wrap damage area with insulating tape. Make certain that each wrap overlaps the previous wrap by 50-percent.
(2)Extend the wrapping at least 2 in. (50.8 mm) beyond the original wrap.
(3)If the harness was double-wrapped or if wrapping a splice repair, wrap another layer of insulating tape over the damage area in the opposite direction of the first wrap.

F. Tie both ends of the insulating tape in place with tie tape.



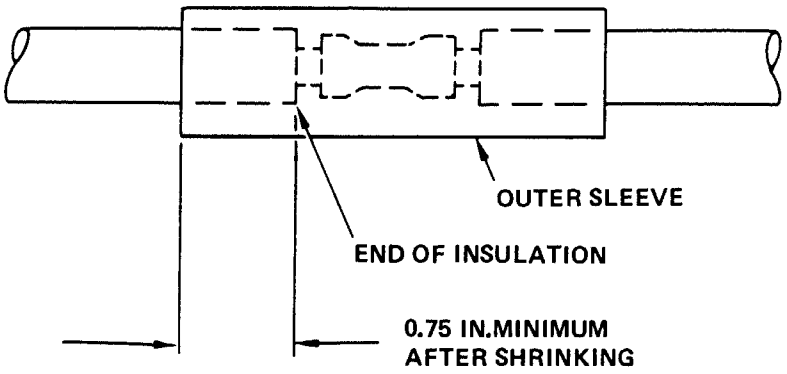
BM5 71 50 00 8 LCMO - 23 - 18
DM5

Staggered Wire Splice
Figure 802



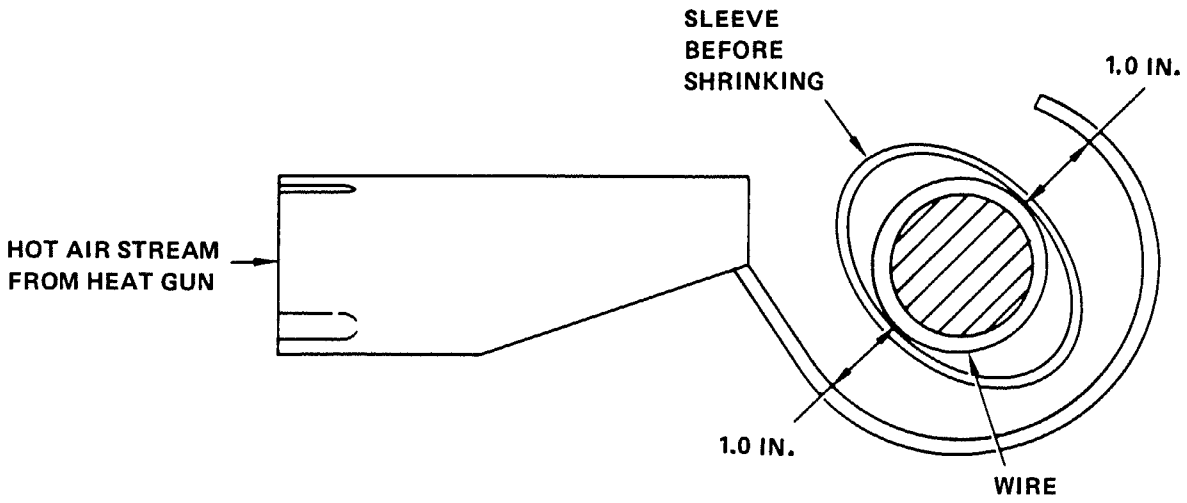
BM5 71 50 00 8 LEMO - 23 - 18
DM5

Individual Wire Splice
Figure 803



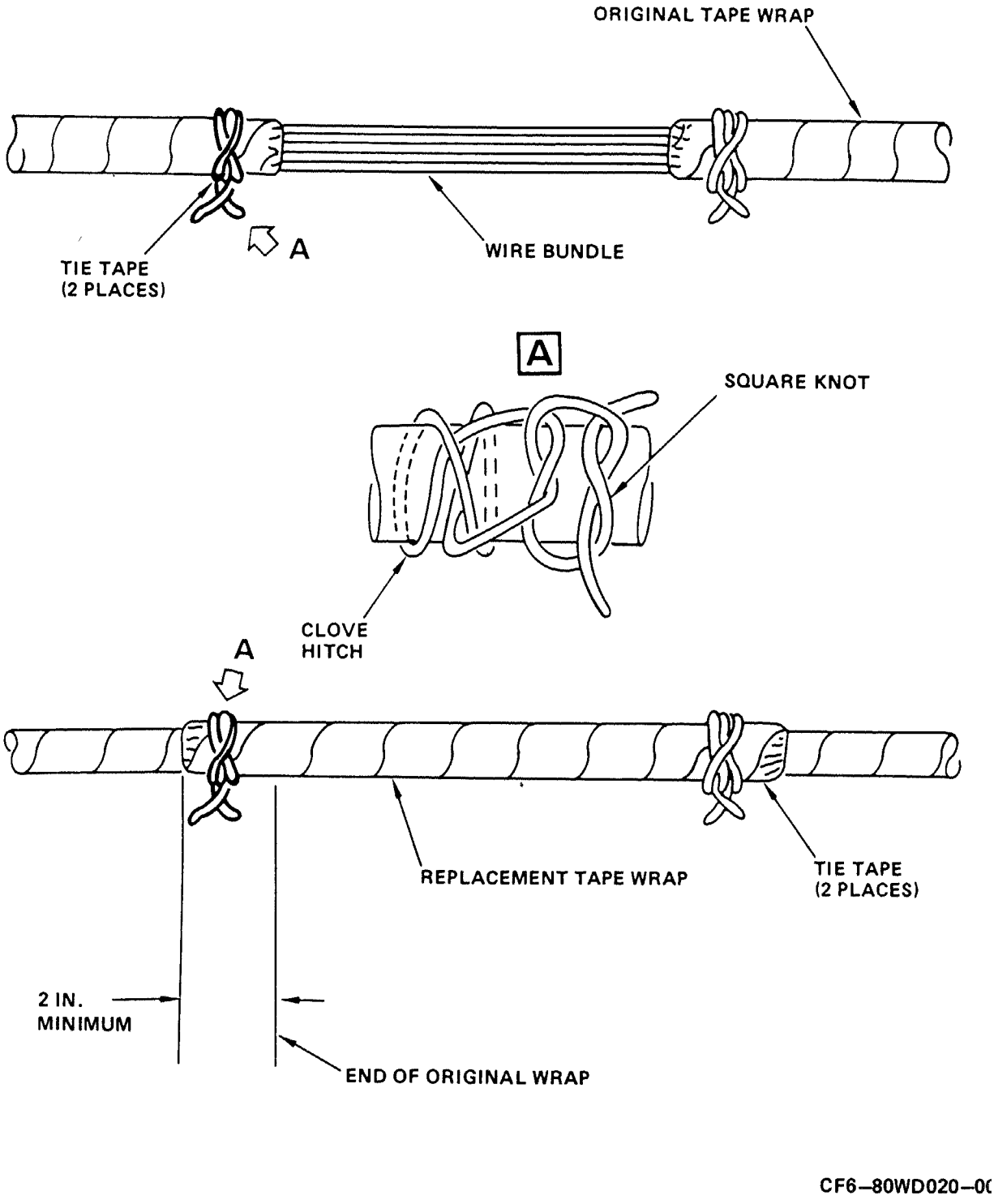
BM5 71 50 00 8 LGMO - 23 - 18
DM5

Heat Shrink Sleeve Installation
Figure 804



BM5 71 50 00 8 LJMO - 23 - 18
DM5

Heat Reflector Contour
Figure 805



Harness Wrap Replacement
Figure 806

ENGINE FAN CASE ELECTRICAL HARNESS - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the fan zone wire harness.

B. Access to the fan zone wire harness is through the fan cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breakers Safety Clips
B.	Access Platform
C.	Torque Wrench 20-25 lbf. in. (0.23-0.28 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

CAUTION : USE ELECTRICAL CONNECTOR PLIERS ONLY TO AVOID DAMAGE TO CONNECTORS.

A. Job Set-Up

(1)On panel 133VU open, safety and tag all circuit breakers related to engines together with the following ones.

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H12
21VU	AIDS		105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 STICK SHAKR		109/A 2 thru A 5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG 1 & 2/SQUIB B		207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57

For ENGINE 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54

PANEL	SERVICE	IDENT.	LOCATION
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG1	3DN	322/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/V57 thru V58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

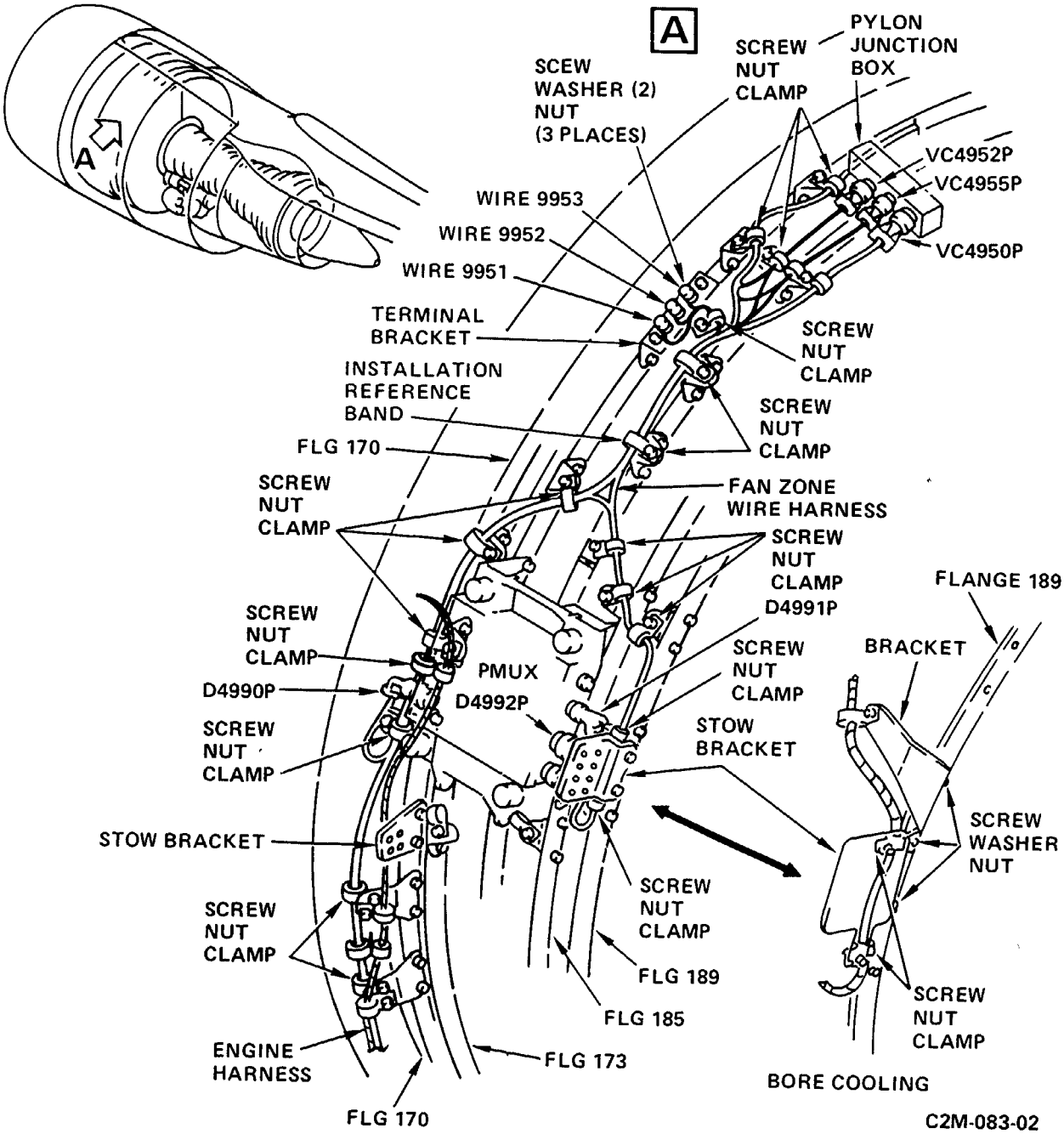
For ENGINE 2

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ENG 2/ VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/CONTROLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG2/PUMP CTL		332/U57 thru U58

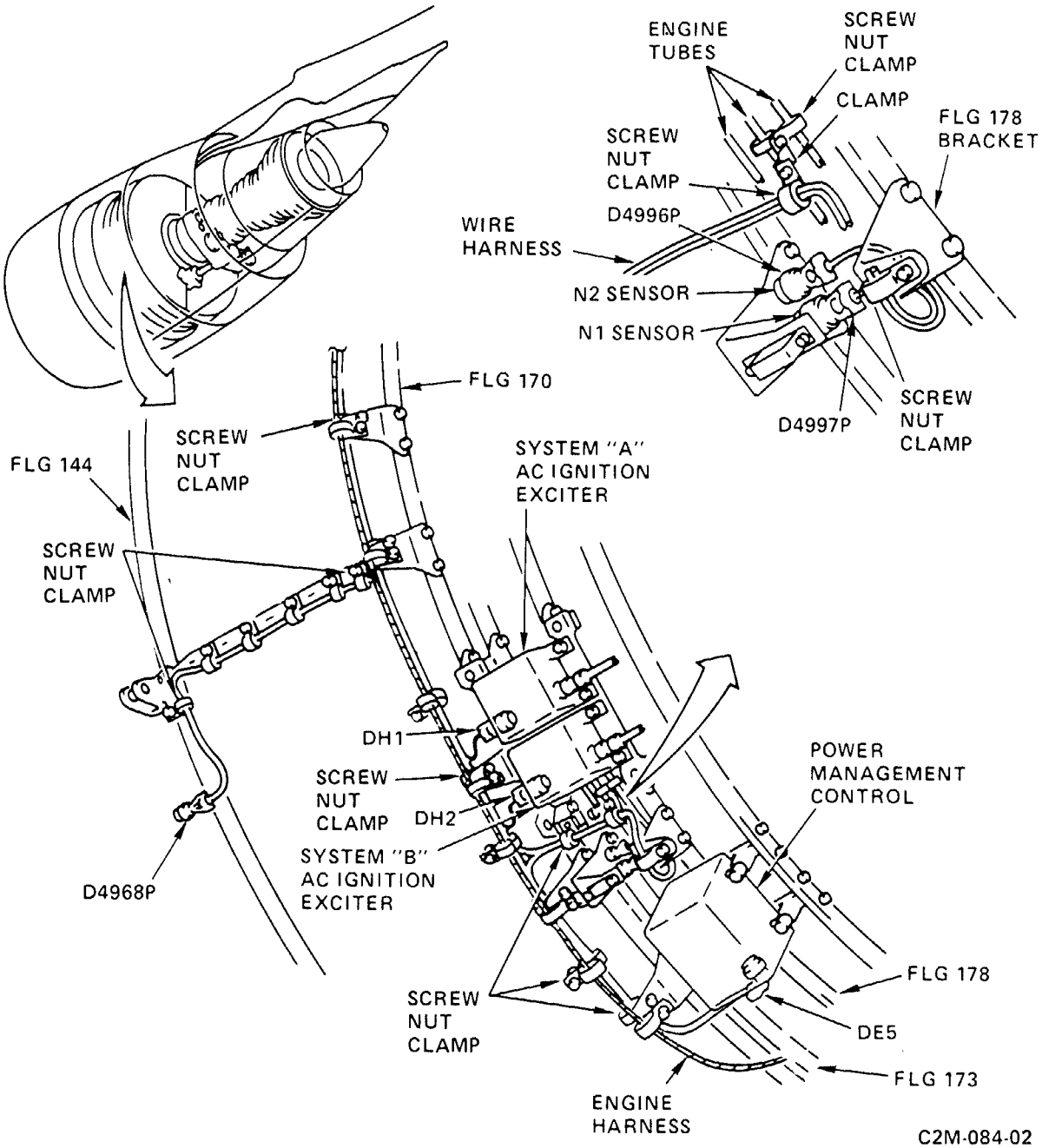
(2)Open fan cowl doors (Ref. 71-23-00, P. Block 301).
(3)Install access platform.

B. Removal (Ref. Fig. 401, 402, 403)
(Ref. Fig. 404, 405, 406)
(1)Disconnect electrical connector DE5 from Power Management Control Box (PMC).
(2)Disconnect electrical connector D4996P from N2 sensor and D4997P from N1 sensor.
(3)Disconnect electrical connectors DH1 and DH2 from systems A and B AC ignition exciters.
(4)Disconnect electrical connector D4968P from nose cowl.
(5)- With PMUX
Disconnect electrical connectors D4990P, D4991P, and D4992P from PMUX.
- Without PMUX
Disconnect electrical connectors D4990P, D4991P, and D4992P from stow brackets.
(6)Remove nuts, screws, and washers attaching wires 9951, 9952 and 9953 to terminal bracket.
(7)Disconnect DT584 from engine oil quantity transmitter and DS299 from oil filter differential pressure switch.
(8)Disconnect electrical connectors VC4950P, VC4952P, and VC4955P from pylon interface.
(9)Remove attaching hardware and electrical harness from fan case.

C. Installation (Ref. Fig. 401, 402, 403)
(Ref. Fig. 404, 405, 406)
(1)Remove protective covers from connectors, receptacles, and ground terminals.

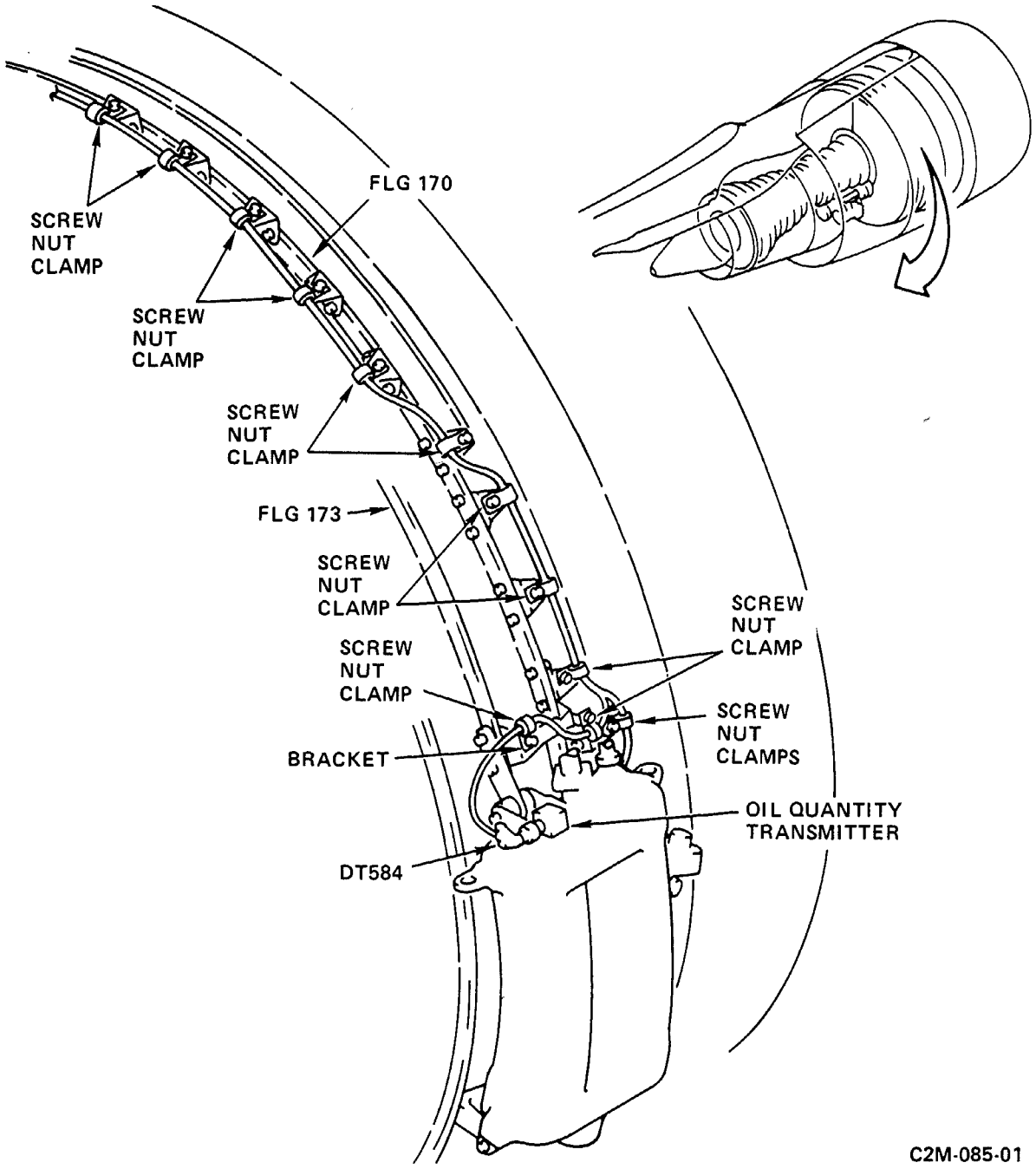


Fan Zone Electrical Harness, Upper Left (With PMUX)
Figure 401



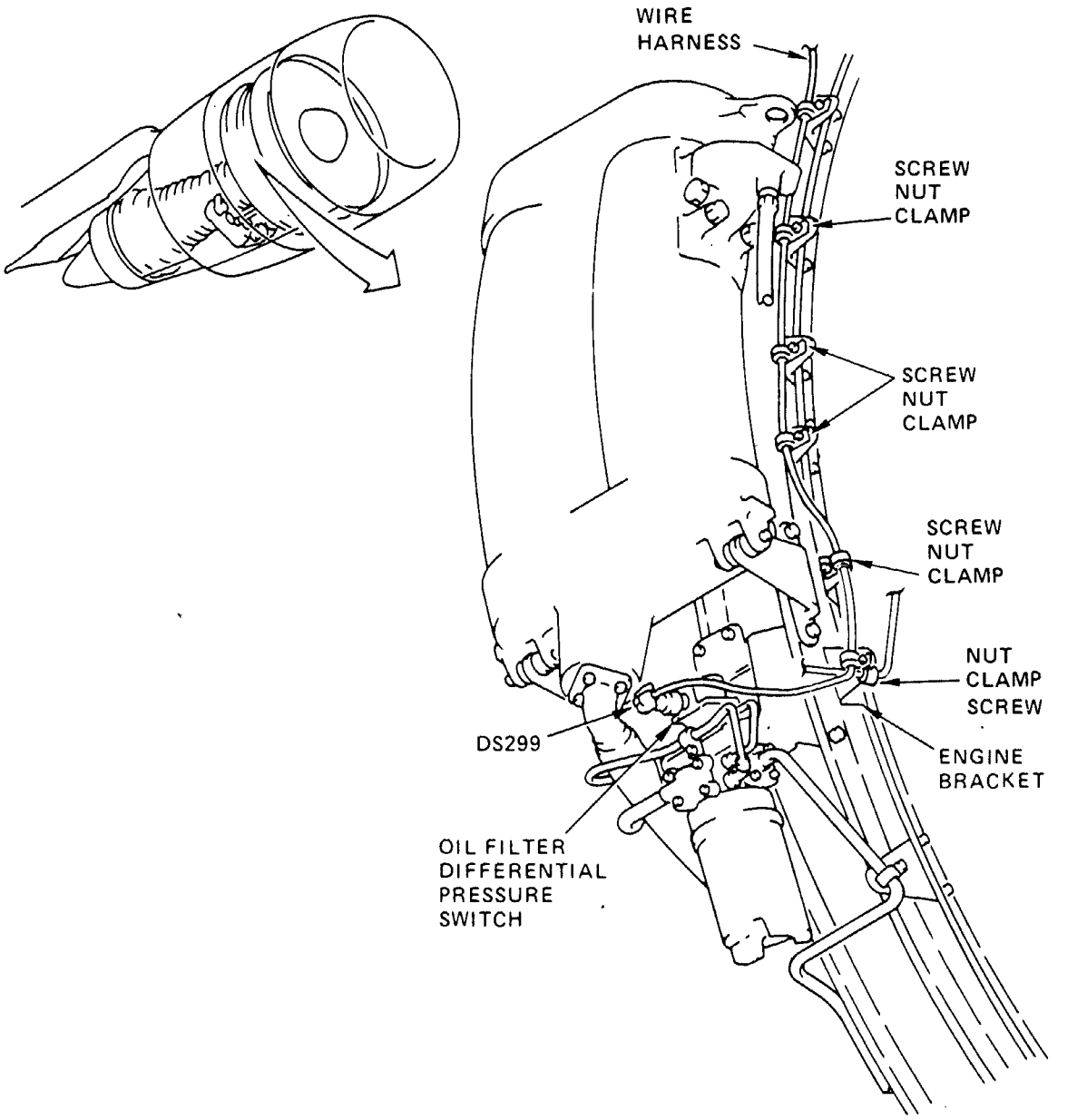
BM5 7.1 51 01 4 LCMO - 20 - 16
DM5

Fan Zone Electrical Harness, Lower Left (With PMUX)
Figure 402



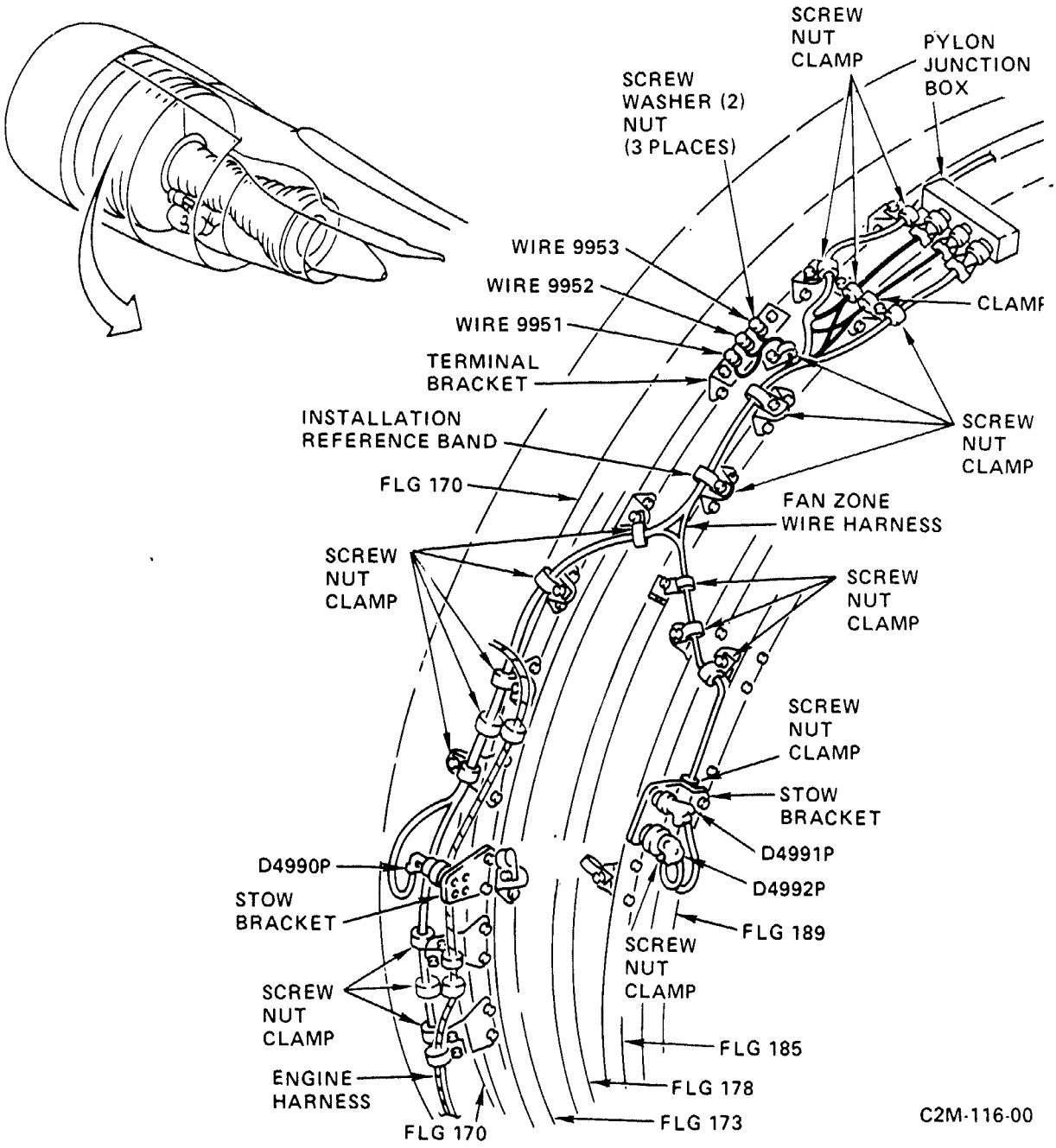
BM5 71 51 01 4 LEMO - 16 - 12
DM5

Fan Zone Electrical Harness, Upper Right
Figure 403



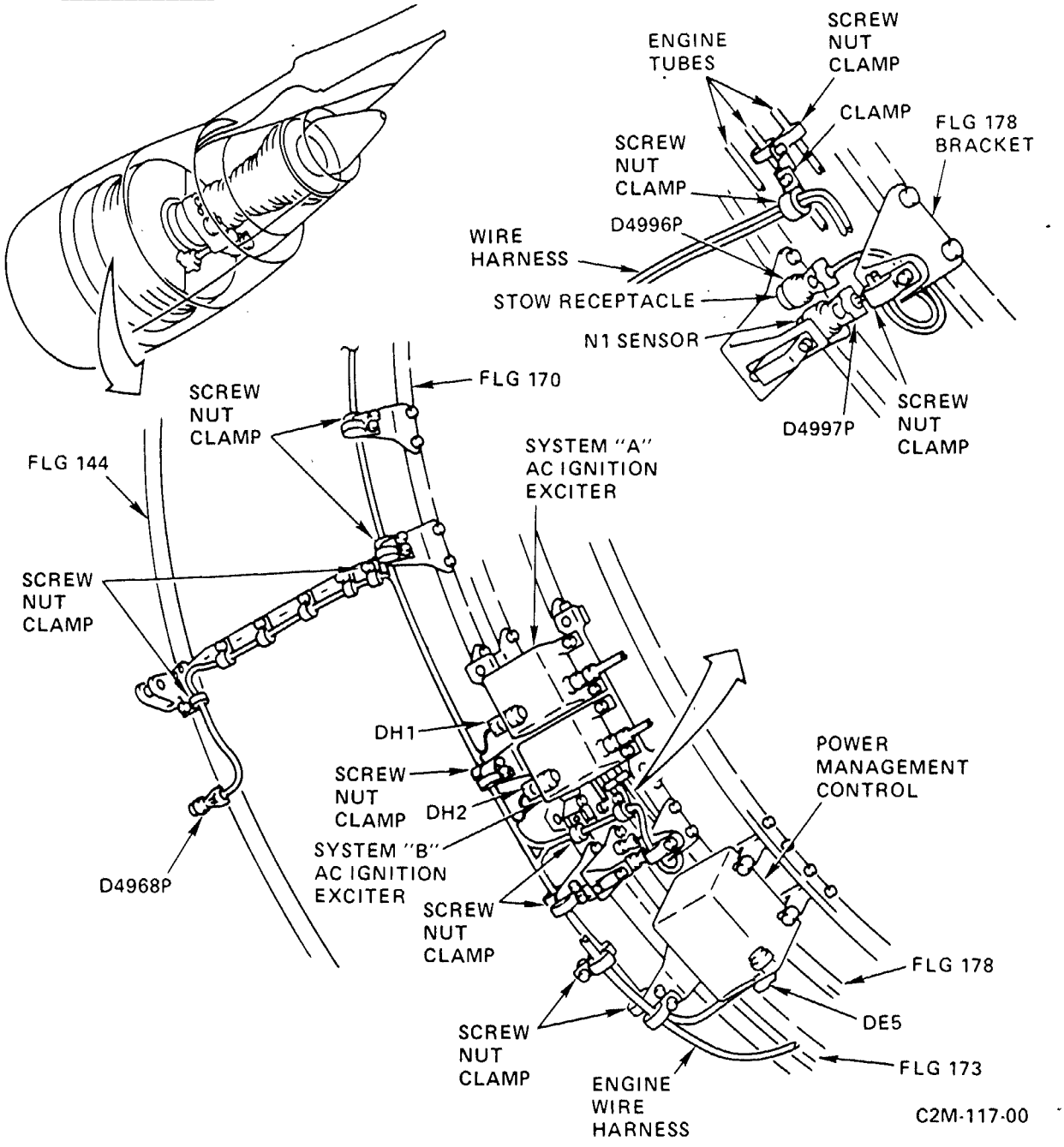
BM5 71 51 01 4 LGMO - 20 - 16
DM5

Fan Zone Electrical Harness, Lower Right
Figure 404



BM5 71 51 01 4 LHMO - 20 - 16
DM5

Fan Zone Electrical Harness, Upper Left (Without PMUX)
Figure 405



BM5 71 51 01 4 LJMO - 20 - 16
DM5

Fan Zone Electrical Harness, Lower Left (Without PMUX)
Figure 406

(2)Position electrical harness on fan case and connect electrical connectors VC4950P, VC4952P, and VC4955P to pylon interface. Tighten connectors handtight plus one-eighth turn.
(3)Connect electrical connector DT584 to engine oil quantity transmitter and DS299 to oil filter differential pressure switch.
(4)Install wires 9951, 9952, and 9953 on terminal bracket with screws, washers, and nuts. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(5)Connect electrical connector D4968P to nose cowl.
(6)- With PMUX
Connect electrical connectors D4990P, D4991P, and D4992P to PMUX.
- Without PMUX
Connect electrical connectors D4990P, D4991P, and D4992P to stow brackets.
(7)Connect electrical connector DH1 to system A and DH2 to system B AC Pignition exciters.
(8)Connect electrical connector D4996P to N2 and D4997P to N1 sensor connectors.
(9)Connect electrical connector DE5 to power management control box.
(10)Tighten all electrical connectors by hand until locking device on each connector is engaged as evidenced by a click and a visible indicator in connector shell window.
(11)Align harness and install clamps, bolts, washers, and nuts attaching fan zone electrical harness to fan case. TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform
(3)Close fan cowl doors (Ref. 71-13-00, P. Block 301).
(4)Remove safety clips and tags and close the following circuit breakers :
- All circuit breakers related to engine on panel 133VU.

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H12
21VU	AIDS		105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 STICK SHAKR		109/A 2 thru A 5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG 1 & 2/SQUIB B		207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57

For ENGINE 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG1	3DN	322/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/V57 thru V58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

For ENGINE 2

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ENG 2/ VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/CONTROLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG2/PUMP CTL		332/U57 thru U58

ENGINE CORE ELECTRICAL HARNESS - IDG SYSTEM - MAINTENANCE PRACTICES

1. Reason for the Job

This procedure provides instructions to examine the IDG cable and the IDG cable clamps for chafing of the molded silastic clamp insert and/or the IDG cable and temporary repair or replacement.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench
C. RT1146	Tubing
D. RL-6000-SA	Tape
E. Material No.C01-007	Adhesive, Plastic, Sealants (Ref. 70-00-00)
F. 190L0F21G	Tape
Referenced Procedures	
- 20-31-00, P. Block 001	List of Materials required for Aircraft Service and Maintenance
- 71-13-00, P. Block 301	Cowl Doors
- 71-52-01, P. Block 401	Engine Core Electrical Harnesses

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	DISC/IDG1	3XT	206/D20
22VU	DISC/IDG2	4XT	206/D21

(2)Open, safety, and tag the circuit breaker for the appropriate engine and open the left thrust reverser cowl door (See 71-13-00, P. Block 301).

B. Inspection of IDG Power Wire Harness and Attaching Clamps

(1)Find the IDG power wire harness on the left side of the engine core.

R **ON A/C 001-100,

(Ref. Fig. 201)

R **ON A/C 001-100,

(2)Open the clamps that hold the IDG power wire harness. Remove the rubber inserts from the clamps and keep them.

(3)Examine the rubber inserts for excessive wear.

Discard worn inserts.

(4)Examine the IDG power wire harness assembly for chafing at the clamp locations.

(a)If insulation is worn through to the conductor, the IDG power wire harness must be replaced. (See 71-52-01, P. Block 401 for removal of the IDG power wire harness assembly).

(b)If outer jacket or underlying fiberglass insulation is worn, but not through to the conductor, a temporary repair can be made to the IDG power wire harness assembly. (See paragraph 3.C.).

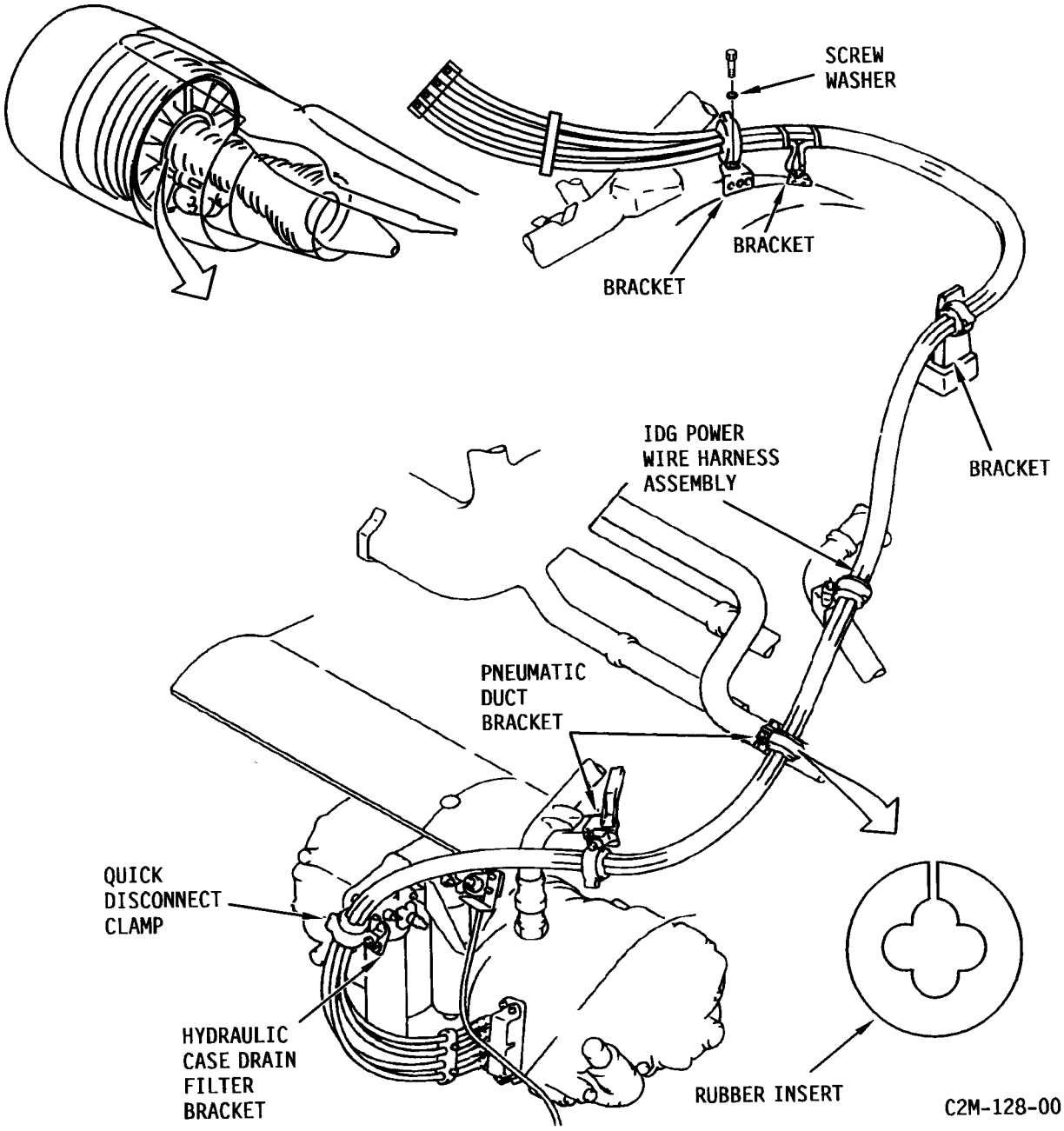
(c)If insulation on the IDG power wire harness assembly is not damaged, IDG power wire harness is acceptable. Install the clamps on the harness in accordance with paragraph 3.D.

R **ON A/C 001-100,

(Ref. Fig. 201, 202)

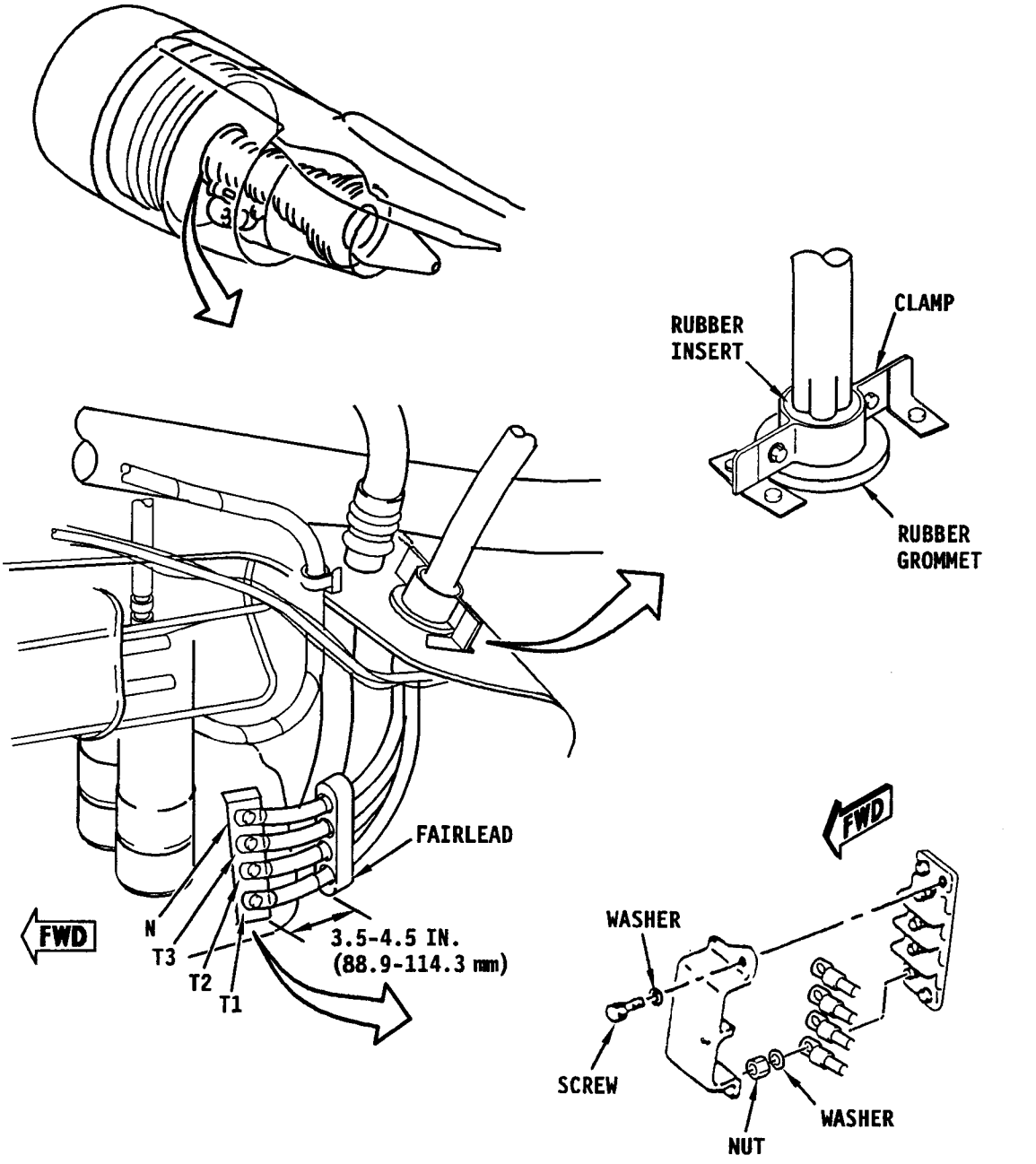
R **ON A/C 001-100,

NOTE : If the damage is not acceptable, return the damaged harness to the manufacturer.



BM5 71 52 01 2 LBNO 00

Clamp and Harness
One Piece Harness
Figure 201



BM5 71 52 01 2 LAMO 00

Clamp and Harness
Post SB ROHR 24-015
Figure 202

C. Temporary Repair of IDG Power Wire Harness Assembly
(Ref. Fig. 203)

(1) Remove the IDG power wire harness assembly from the power plant in accordance with 71-52-01, P. Block 401.

Pre SB ROHR 24-015

(2) Note and mark the location of the wires running through the wire support fairlead. Mark the wires and the fairlead.

(3) Remove the two bolts, four washers, and two nuts that attach the wire support fairlead to the IDG power wire harness assembly.

End Pre SB ROHR 24-015

(4) Note the location and the positioning of all the string tying tape on the IDG power wire harness assembly. Remove the string tying tape.

NOTE : If RT1146 heat shrink tubing is not available, use RL6000-5A series tape. Put the tape on the chafed areas by slightly pulling while putting it on. Wrap with a 50 % overlap 3 layers thick.

(5) Measure the lengths of the chafing damage on the lead or leads of the IDG power wire harness assembly. Cut a piece of RT1146 1.0 in. (25.4 mm) diameter heat shrink tubing 1.0 in. (25.4 mm) longer than the damaged area for each of the damaged areas.

(6) Slide the heat shrink tubing over the terminal lugs of the damaged areas. Make an overlap to each damaged area on the wire harness leads by 0.50 in. (12.7 mm).

WARNING : DO NOT USE HEAT GUNS WHERE FUEL OR FUEL VAPOR IS PRESENT. HEAT GUNS ARE A SOURCE OF COMBUSTION. FUEL OR FUEL VAPOR EXPLOSION MAY CAUSE INJURY OR DEATH.

(7) Use a heat gun to make small the RT1146 heat shrink tubing to cover damaged areas.

NOTE : The tubing must be heated uniformly to assure even wall thickness and avoid heat damage.

Pre SB ROHR 24-015

(8) Install the wire harness leads on power wire harness assembly into the wire support fairlead at locations noted in paragraph 3.C.(2). Attach with the two bolts, four washers, and two nuts.

(9) TORQUE the nuts to between 20 and 25 lbf. in. (0.23 and 0.28 m.daN).

End Pre SB ROHR 24-015

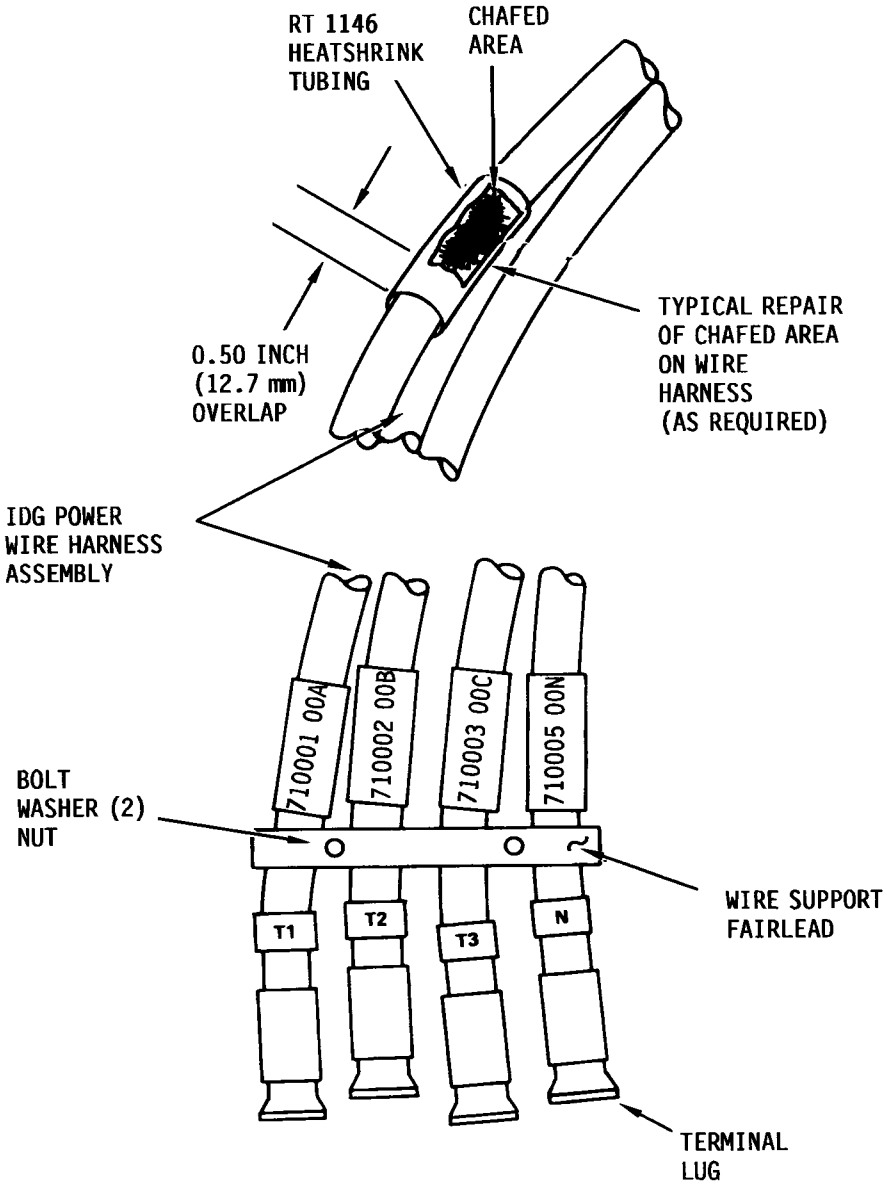
(10) String tie the IDG power wire harness assembly in an interwoven pattern with 190L0F21G tying tape at the locations noted in paragraph 3.C.(4).

(11) Install the repaired IDG power wire harness assembly in accordance with 71-52-01, P. Block 401.

D. Close-Up

(1) Remove the safety clips and the tags and close the circuit breakers 3XT and 4XT.

(2) Close the LH thrust reverser door (See 71-13-00, P. Block 301). Remove



C2M-130-00

BM5 71 52 01 2 LGMO 00

Repair of IDG Wire Harness Assembly
Figure 203

the safety clips and the tags, and close the circuit breakers for the applicable engine.

ENGINE CORE ELECTRICAL HARNESSES - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of core zone wire harness.

B. Access to the core wire harness is through the thrust reverser doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Access Platform
C.	Torque Wrench 20-190 lbf.in. (0.23-2.15 m.daN)
D.	Corrosion Resistant Steel Lockwire
E. Material No.C01-007	Adhesives, Plastics, Sealants (Ref. 70-00-00)
F. Material No. 08-004	Bonding and Adhesive Compounds (20-31-00)
Referenced Procedure	
- 71-13-00, P. Block 301	Cowl Doors

R **ON A/C 001-100,

- 06-41-54, P. Block 001	Nacelles and Pylons
- 20-31-00, P. Block 001	Fuselage

R **ON A/C 001-100,

3. Procedure

A. Job Set-Up

(1)On panel 133VU, open safety and tag all circuit breakers related to engines together with the following ones :

For ENGINE 1 & 2

PANEL	SERVICE	IDENT. LOCATION
21VU	AFS/TCC	102/H 8 thru H12
21VU	AIDS	105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC	108/B 1 thru B13
21VU	SDAC - FWC2 STICK	109/A 2 thru A 5
	SHAKR	and A 8 thru A10
22VU	ELEC/DISC	206/D20 thru D21
22VU	N1	207/C15 thru C16
22VU	FIRE EXTING/ENG1 & 2/SQUIB B	207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY	331/V81
133VU	HYDRAULIC/PTU CTL	332/U59 thru U60

PANEL	SERVICE	IDENT.	LOCATION
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/57

For ENGINE 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 1	3DN	322/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/Y57 thru Y58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

For ENGINE 2

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ ENG 2/VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/ CONTROLLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG 2/PUMP CTL		332/U57 thru U58

(2)Open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).
(3)Install access platform.

R **ON A/C 001-100,

B. Removal of the IDG harness in one Piece Configuration
(Ref. Fig. 401)
(1)Removal of the IDG HARNESS (engine part)
(a)Remove the screws that attach the terminal lugs VT1, VT2, VT3, and VT4 at the pylon interface. Keep the attaching hardware.
(b)Remove the two screws, two washers, and quick disconnect clamp TA11C91-1 that attach the IDG power wire harness to the top bracket assembly. Keep the hardware.

(c)Remove the screw, washer, and nut that attach the 710004-00N wire and the 710005-00N wire on the IDG power wire harness assembly to the ground bracket and disconnect the two wires. Keep the hardware.
(d)Remove the IDG power wire harness from the quick disconnect clamps.
(e)Remove the two screws and washers that attach the terminal cover over the IDG studs. Remove and keep the terminal cover with the hardware.
(f)Remove the four nuts and washers that attach the 710005-00N wire to the stud N, 710001-00A wire to the stud T1, 710002-00B wire to the stud T2, and the 710003-00C wire to the stud T3. Keep the attaching hardware.

Post SB ROHR 24-015

(g)Remove fairlead from harness. Keep the attaching hardware (Ref. Fig. 402).
(h)Remove harness from clamp and grommet on heatshield.

End Post SB ROHR 24-015

(i)Remove harness from engine.

(2)Removal of the IDG harness (pylon part)
(a)Open the access door 411CL, 411AZ, 421CL, 421AZ (Ref. AMM 06-41-54).
(b)Remove the two flanges (4), the two clamps (5), the bolt (7), the two bolts (3), the bolt (6), the two nuts (1), the two washers (2) at the pylon bracket. Keep the attaching hardware.
(c)Remove lockwire, the nut of the pylon fire shield 305VP (306VP).
(d)Remove the upper part of the rake.
(e)Remove the screws (8), washers (9) and the screws (10) and washers (11) to remove cover from the pylon junction box.
(f)Disconnect the wires 720001-00A, 720002-00B, 720003-00C and 720004-00N at the pylon junction box.
(g)Remove the IDG power wire harness.

R **ON A/C 001-100,

(2)Remove left core wire harness 224W4711 as follows :
(a)Disconnect electrical connectors VC4959P, VC4968P, VC4963P, VC4961P, VC4962P and VC4969P from pylon junction box (Ref. Fig. 403, 404).
(b)Disconnect electrical connector DV220 from anti-ice valve and DT609 from core vibration transducer.
(c)Remove quick disconnect bracket from pylon.
(d)Remove screws, nuts, and clamps attaching harness 224W4711 and 224W4712 to duct brackets (5 places), core bracket, and engine mount bracket.
(e)Remove screws, nuts, and clamps attaching DT608 branch of harness 224W4711 to core brackets and tube.
(f)Disconnect electrical connectors DT608 from number 1 fan bearing vibration transducer, DT603A from high stage temperature sensor, D4987P from exhaust gas temperature (EGT) probe, and DS302 from low pressure turbine (LPT) cooling valve, left.
(g)Remove screw, nut, and clamp attaching harnesses to duct brackets (3 places) and tubes (4 places).
(h)Remove screw, nut, and clamp attaching harness to heat shield bracket.
(i)Disconnect electrical connectors DG13A and DG13B from IDG.
(j)Remove harness from quick disconnect clamps on hydraulic filter bracket remove harness from engine.

(3)Remove right core harnesses 224W4712 and 224W4716 as follows : (Ref. Fig. 405, 406, 407)
(a)Disconnect electrical connectors VC4960P (if equipped), VC4967P, VC4965P, VC4970P, and VC4966P from pylon junction box.
(b)Disconnect electrical connectors VC2075 (VC2076), VC2083 (VC2084) from pylon junction box.
(c)Disconnect electrical connectors DV222 from thrust reverser regulator valve, DV224A and DV224B from pneumatic pressure regulator valve.
(d)Remove cover from terminal board and remove nuts and washers attaching wires to studs. Remove wires from studs.
(e)Remove screws, washers, nuts, and clamps attaching harnesses to support tube and engine core bracket.
(f)Remove quick disconnect bracket from pylon.
(g)Disconnect electrical connectors DS301 from low pressure turbine (LPT) cooling valve, right ; DV225A, DV225B and DV225C from high pressure bleed control valve.
(h)Remove screws, washers, nuts, and clamps attaching harness to duct brackets and tube.
(i)Disconnect electrical connectors D4993P from D4993J, DV226 from IDG cooling valve, DH4P and DH5P from fire detector stow bracket, 51HAA (52HAA) from fan air valve, and DT604 from variable stator vane (VSV) stow bracket.
(j)Remove screws, nuts, spacers, and clamps attaching harnesses to heat shield brackets, hydraulic tube, stow bracket, IDG cooling valve, and air cooling tube. Remove harnesses from engine.

**ON A/C 001-100,

R CAUTION : IF A PRE SB 24-015 IDG HARNESS IS INSTALLED ON A POST SB 72-0875
R ENGINE, MAKE SURE THE IDG CUTOUT IN THE HEATSHIELD HAS COVER PLATE
R (PN 1978M24P001A) INSTALLED.

C. Installation of the IDG harness in one piece configuration (Ref. Fig. 401)
(1)Installation of the IDG harness (pylon part)
(a)Route the IDG harness end without terminals through the pylon fire shield 305VP (306VP).
(b)Pull harness out top of pylon to crimp terminals on crimp on terminal ends.
(c)Install the pylon fire shield nut.
(d)At the pylon jonction box, connect the wire 710001-00A to the terminal block stud 1, wire 710002-00B to stud 2, wire 710003-00C to stud 3 and wire 710004-00N to stud 4 with nuts and washers.
TORQUE the nuts to between 178 and 194 lbf.in. (2.01 and 2.19 m.daN).
(e)Install the two flanges (4), the two clamps (5), the bolt (7), the two bolts (3), the bolt (6), the two nuts (1), the two washers (2) at the pylon bracket.
(f)Seal the wires on the output from the junction box with Material

No. 08-004 (Ref. AMM 20-31-00).

(g)Check IDG power wire harness to eliminate any preload.

(h)TORQUE the nut of pylon fire shield to between 133 and 256 lbf.in. (1.50 and 2.89 m.daN) and wirelock.

(i)Install the cover onto the junction box and secure with the screws (8), washers (9) and the screws (10) and the washers (11). TORQUE the screw (8) and (10) to between 21 and 23 lbf.in. (0.23 and 0.26 m.daN).

(j)Close the access door 411CL (421CL), 411AZ (421AZ) (Ref. 06-41-54).

(2)Installation of the IDG harness
(engine part)

(a)Connect the terminal lugs of the IDG power wire harness at the pylon interface :

1 Attach the IDG power wire harness cable 720001-00A (VT1), 720002-00B (VT2), 720003-00C (VT3), and 720004-00N (VT4) to their proper terminals at the pylon interface with the saved hardware.

2 Install the quick disconnect clamp TA11C91-1 that attaches the IDG power wire harness to the top bracket with the screws and washers. TORQUE the screws to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

3 Attach the 710004-00N wire and the 710005-00N of the IDG power wire harness assembly to the ground bracket with the screw, washer, and nut. TORQUE the nut to between 160 and 190 lbf.in. (1.8 and 2.2 m.daN).

NOTE : Make sure the IDG power wire harness has no twist in the wires. The T3 cable should be in the inner forward side of the harness curve.

Post SB ROHR 24-015

NOTE : Rohr Service Bulletin 24-015 reroutes the IDG power wire harness assembly through the heatshield. The clamp and bracket on the hydraulic case drain filter are removed. All other clamp locations remain the same.

(b)Route the IDG power wire harness through the clamp and the rubber grommet in the heatshield. Put the serviceable rubber insert on the IDG power wire harness. Install and secure the rubber insert in the clamp.

(c)Install the fairlead on the wire harness between 3.5 and 4.5 in. (88.9 and 114.3 mm) from the T1 terminal lug.

End Post SB ROHR 24-015

(d)Put the six serviceable rubber inserts over the IDG power wire harness assembly. Install and clamp the rubber inserts in the quick disconnect clamps.

NOTE : Make sure the insert slits are positioned opposite the harness loading direction.

(e)Install the 710005-00N wire on its stud N, the 710001-00A wire on its stud T1, the 710002-00B wire on its stud T2, and 710003-00C wire on its stud T3 on the terminal block of the IDG. Attach the wires with the four washers and four nuts. TORQUE the nuts to between 144 and 168 lbf.in. (1.63 and 1.89 m.daN).

(f)Install the terminal cover on the terminal block with two screws and two washers. TORQUE the screws to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

(g)Adjust the IDG power feeder harness to eliminate any preload condition

(at terminal connections, clamps or clamp inserts).

(h)Remove each of the rubber inserts in the six quick disconnect clamps. Wind red wrap tape, SA00520, around each individual IDG wire where it touches the rubber insert of a quick disconnect clamp. Apply tape by slightly stretching it so it wraps around the wire one and one-half times. Tape end should be at least 0.25 in. (6.35 mm) underneath the insert. Apply the tape on both sides of the insert for each of the four wires, 8 total places, for each clamp location.

(i)Tighten all the clamps on the IDG power wire harness assembly.

WARNING : ADHESIVE NO.C01-007 IS CLASSIFIED AS A HAZARDOUS MATERIAL WHICH MAY CAUSE INJURY OR ILLNESS IF NOT PROPERLY USED. THIS PRODUCT SHOULD BE USED ONLY IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFIC SAFETY AND HEALTH RECOMMENDATIONS. PRIOR TO THE USE OF THIS PRODUCT, CAREFULLY READ THE APPLICABLE "MATERIAL SAFETY DATA SHEET" AND FOLLOW ALL LISTED SAFETY AND HEALTH PRECAUTIONS.

(j)Spread a continuous bead of Material No.C01-007 around both sides of six IDG clamp rubber inserts. Spread on the sealant approximately 0.25 in. (6.35 mm) deep. Spread on the sealant to fill voids. Put on a final fillet of sealant around the inserts 0.25 in. (6.35 mm) high. (Ref. Fig. 401)

NOTE : If there is a clamp on the heatshield (Post SB ROHR 24-015), do not put Material No.C01-007 around that rubber insert.

(k)Remove any excess adhesive around the inserts.

**ON A/C 001-100,

(2)Install left core wire harness 224W4711 as follows : (Ref. Fig. 403, 404)

(a)Position harness on left side of engine core and connect electrical connectors VC4972P, VC4959P, VC4963P, VC4961P, VC4962P, and VC4969P to pylon junction box. Tighten connectors fingertight plus one-eighth turn.

(b)Attach DT608 branch and main branch of harness to engine mount bracket with clamps, screw, and nut.
Position installation reference band on harness under clamp.

(c)Install quick disconnect bracket on pylon.

(d)Attach harness to engine mount bracket with clamps, screw, and nut.
Position installation reference band on harness under clamp.

(e)Connect electrical connectors DV220 to anti-ice valve and DT609 to core vibration transducer.
Tighten connectors fingertight plus one-eighth turn.

(f)Attach DT608 branch of harness to engine core brackets and tube with clamps, screws, and nuts.

(g)Attach harness to duct brackets (2 places) with clamps, screws, and nuts. Position installation reference band on harness under forward clamp.

(h)Attach harness 224W4712 to engine core bracket with clamp, screw, and nut.

(i)Attach harnesses 224W4711 and 224W4712 to duct brackets (3 places) with clamps, screws, and nuts.

(j)Connect electrical connectors DT608 to number 1 fan bearing vibration transducer, DT603A to high stage temperature sensor, D4987P to exhaust gas temperature (EGT) probe, and DS302 to low pressure turbine (LPT) cooling valve switch, left. Tighten connectors fingertight plus one-eighth turn.
(k)Attach DT608 branch of harness to tubes with clamps, screws, and nuts.
(l)Attach harness to duct and heat shield brackets with clamps, screws, and nuts.
(m)TORQUE all nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
(n)Connect electrical connectors DG13A and DG13B to IDG. Tighten connectors fingertight plus one-eighth turn.
(o)Install harness in quick disconnect clamp on hydraulic filter bracket.

(3)Install right core with harnesses 224W4712 and 224W4716 as follows : (Ref. Fig. 405, 406, 407)
(a)Position harnesses on right side of engine core and connect electrical connectors VC4960P (if equipped), VC4967P, VC4965P, VC4970P, and VC4966P to pylon junction box. Tighten connectors fingertight plus one-eighth turn.
(b)Connect electrical connectors VC2075 (VC2076), VC2083 (VC2084) to pylon junction box. Tighten connectors fingertight plus one-eighth turn.
(c)Attach harnesses to forward end of support tube with clamp, screw, washer, and nut. Position installation reference bands on harnesses under clamp.
(d)Connect electrical connectors DV222 to thrust reverser regulator valve, DV224A and DV224B to pneumatic pressure regulator valve. Tighten connectors fingertight plus one-eighth turn.
(e)Install wires on terminal board with nuts and washers as follows :
Wires 712048-18, 712051-18, and 712054-18 to stud 1
Wires 712049-18, 712052-18, and 712055-18 to stud 2
Wires 712050-18, 712053-18, and 712506-18 to stud 3
TORQUE nuts to betwwen 50 and 70 lbf.in. (0.56 and 0.79 m.daN).
(f)Install cover on terminal board.
(g)Attach harnesses to quick disconnect bracket with clamps, screw, and nut.
(h)Install quick disconnect bracket on pylon (Ref. Fig. 405).
(i)Attach DS302 branch of harness 224W4712 to engine core bracket with clamp, screw, nut, and spacer.
(j)Attach harnesses and throttle cable to support tube with clamps, screws, washer, and nut.
(k)Install harnesses and throttle cable on tube and pneumatic duct brackets with clamps, screws, and nuts.
(l)Connect electrical connectors DS301 to low pressure turbine (LPT) cooling valve switch, right ; DV225A, DV225B, and DV225C to high pressure bleed control valve. Tighten connectors fingertight plus one-eighth turn.
CAUTION : IF YOU DO NOT TIGHTEN THE D4993P TO D4993J CONNECTION, THEY CAN LOOSEN AND/OR DISCONNECT AND CAUSE AN INCORRECT INDICATION.
(m)Connect electrical connectors D4993P to D4993J, DV226 to IDG cooling valve, DH4P and DH5P to fire detector 51HAA (52HAA) to fan air valve

and DT604 to variable stator vane (VSV) stow bracket. Tighten connectors fingertight plus one-eighth turn.

(n)Attach harnesses to heat shield brackets (4 places), hydraulic tube, air cooling tube, and IDG air control valve with clamps, screws, spacers, and nuts.

(o)Attach harness 224W4716 to fire detector stow bracket with clamp, screw and nut.

(p)TORQUE nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove access platform.

(3)Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

(4)Remove safety clips and tags and close the following circuit breakers :

- All circuit breakers related to engines on panel 133VU :

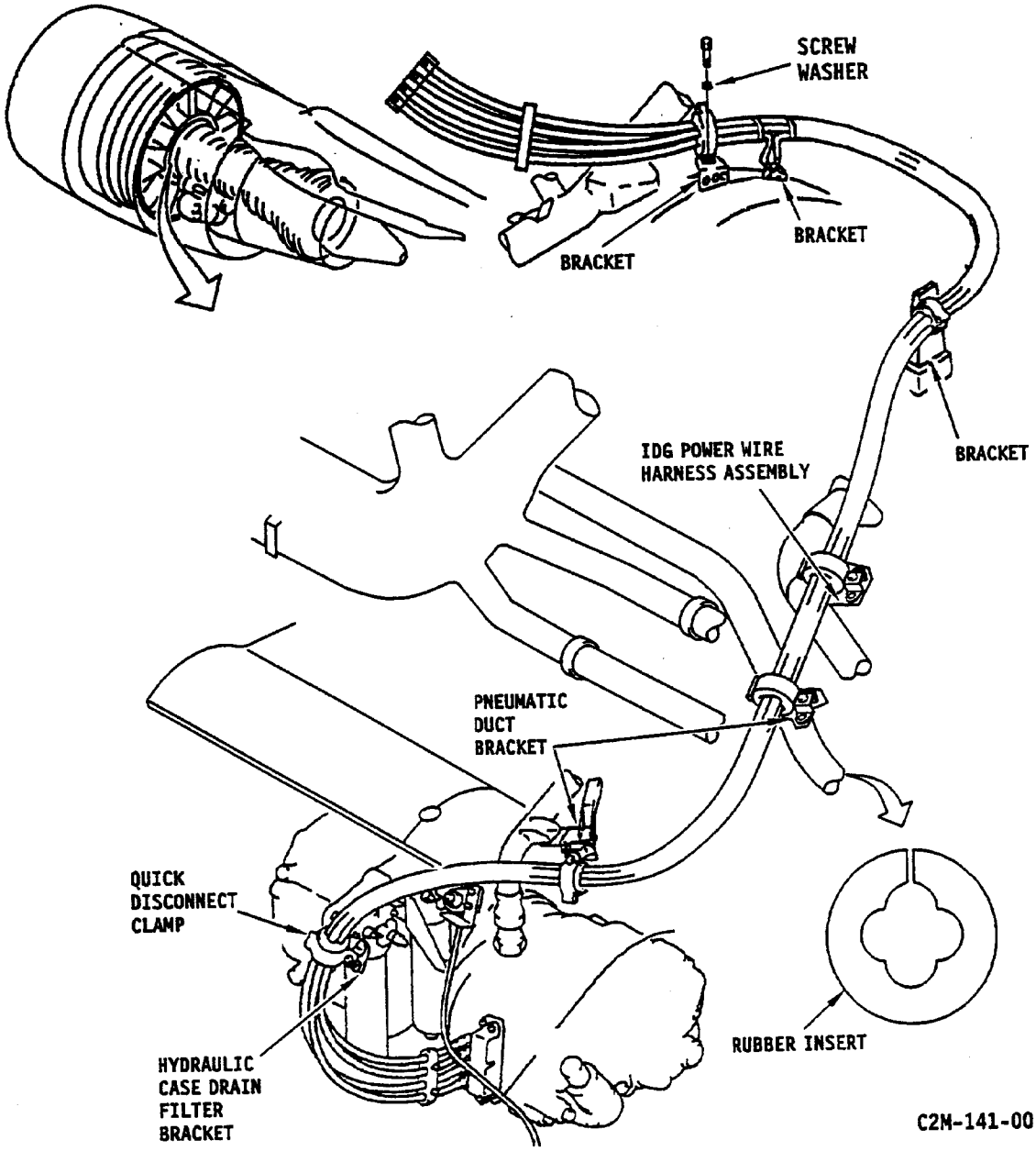
For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H12
21VU	AIDS		105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 STICK		109/A 2 thru A 5
	SHAKR		and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG1 & 2/SQUIB B		207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57

For ENGINE 1

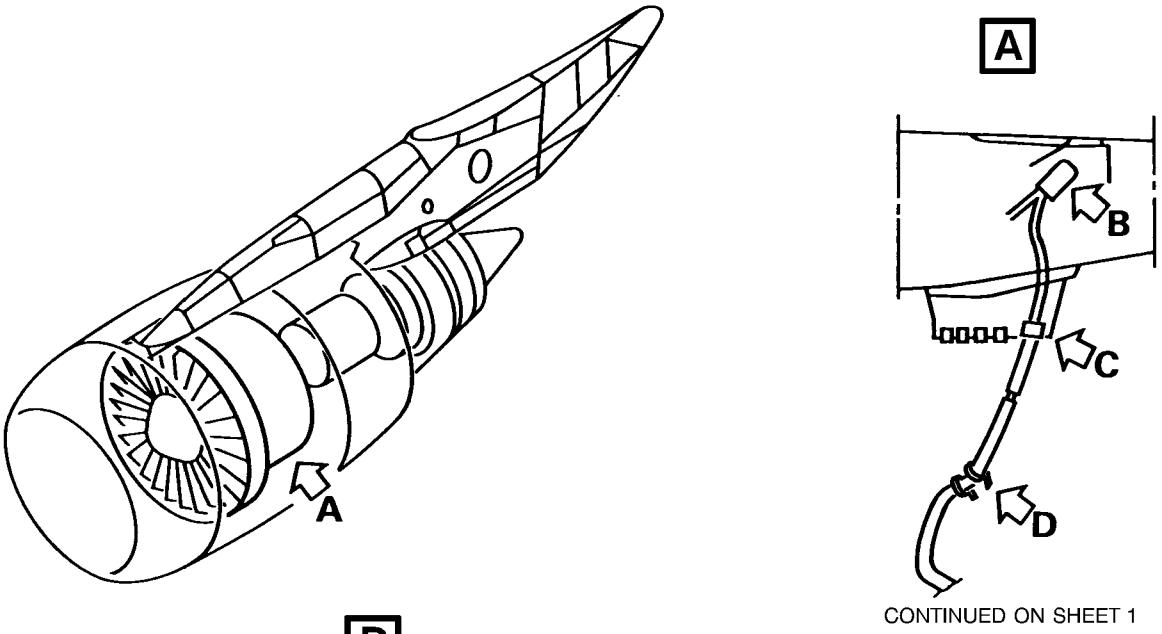
PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 1	3DN	332/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/Y57 thru Y58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

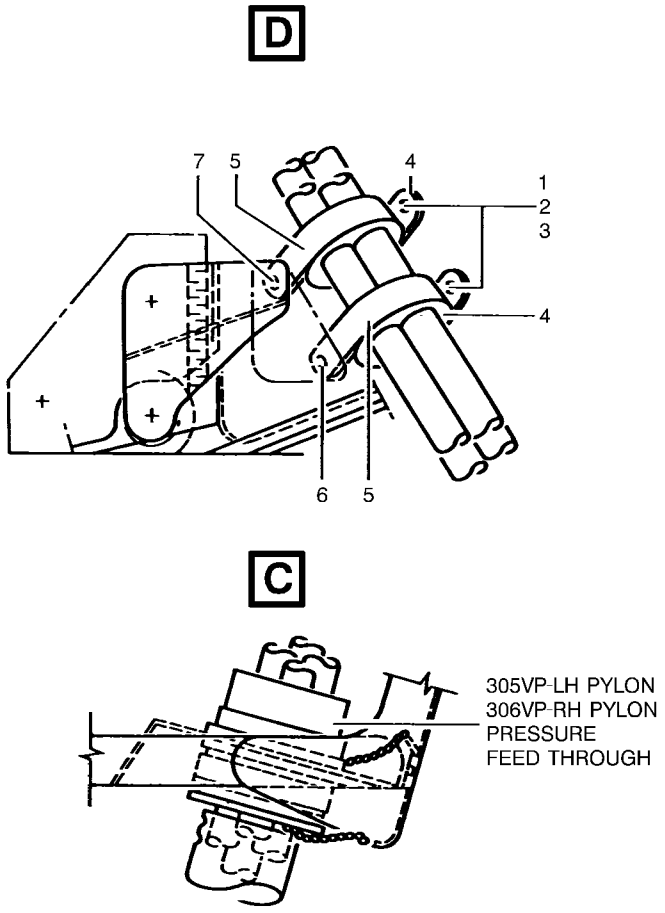
For ENGINE 2



BM5 71 52 01 4 LKNA 01

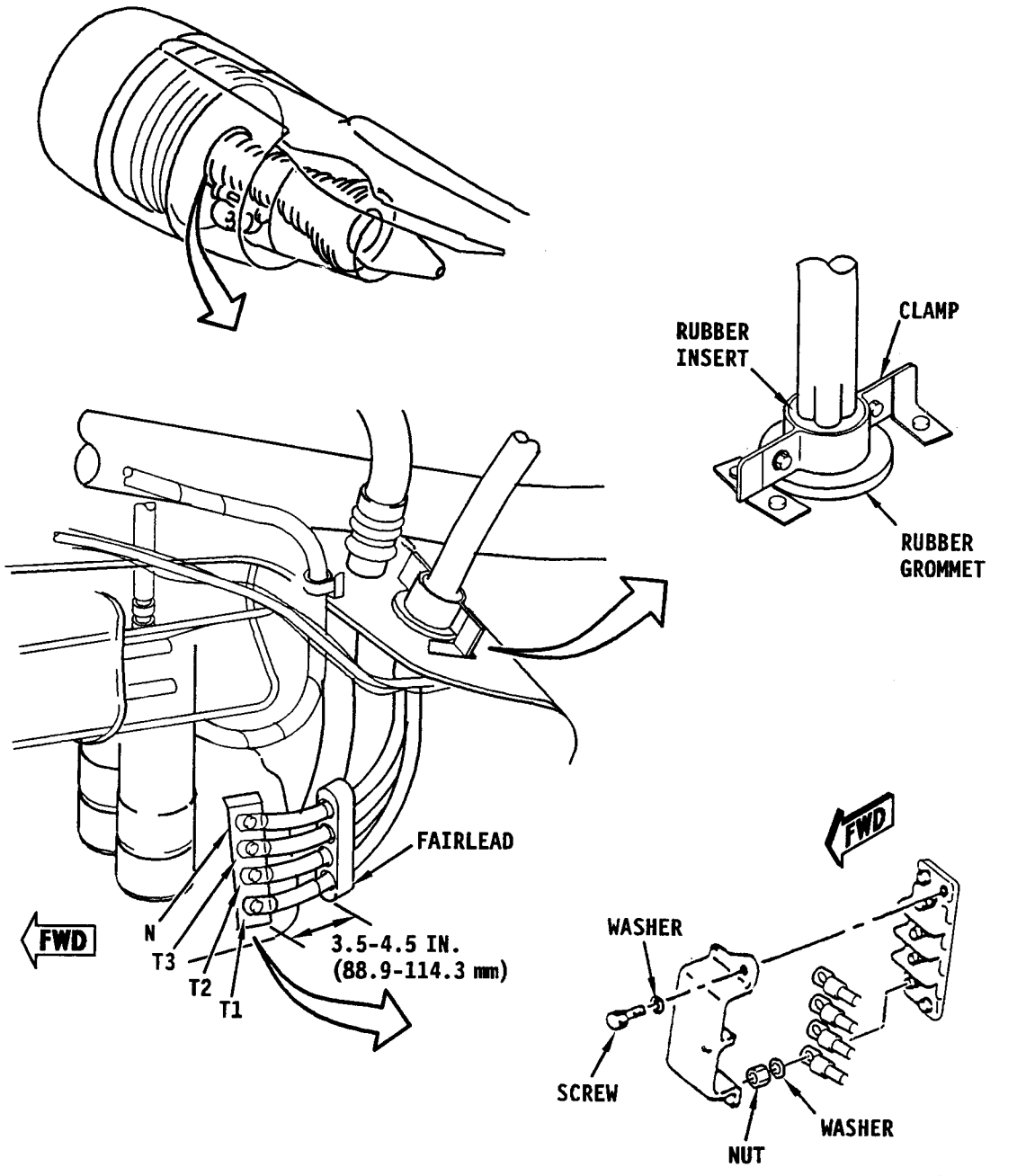
IDG Power Feeder Harness (Sheet 1/2)
Figure 401





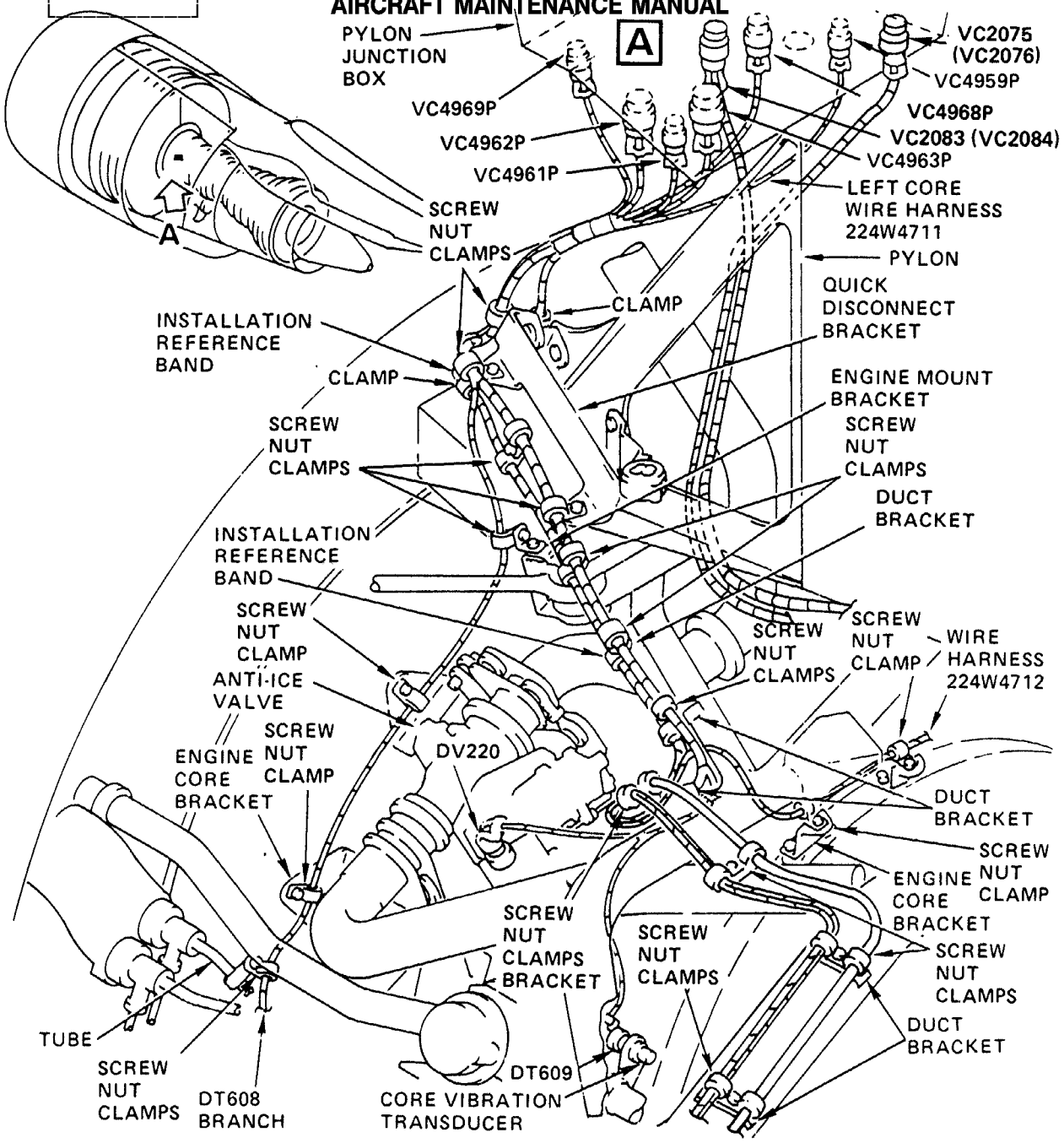
BM5 71 52 01 4 LKNJ 00

IDG Power Feeder Harness (Sheet 2/2)
Figure 401



BM5 71 52 01 4 LMM0 00

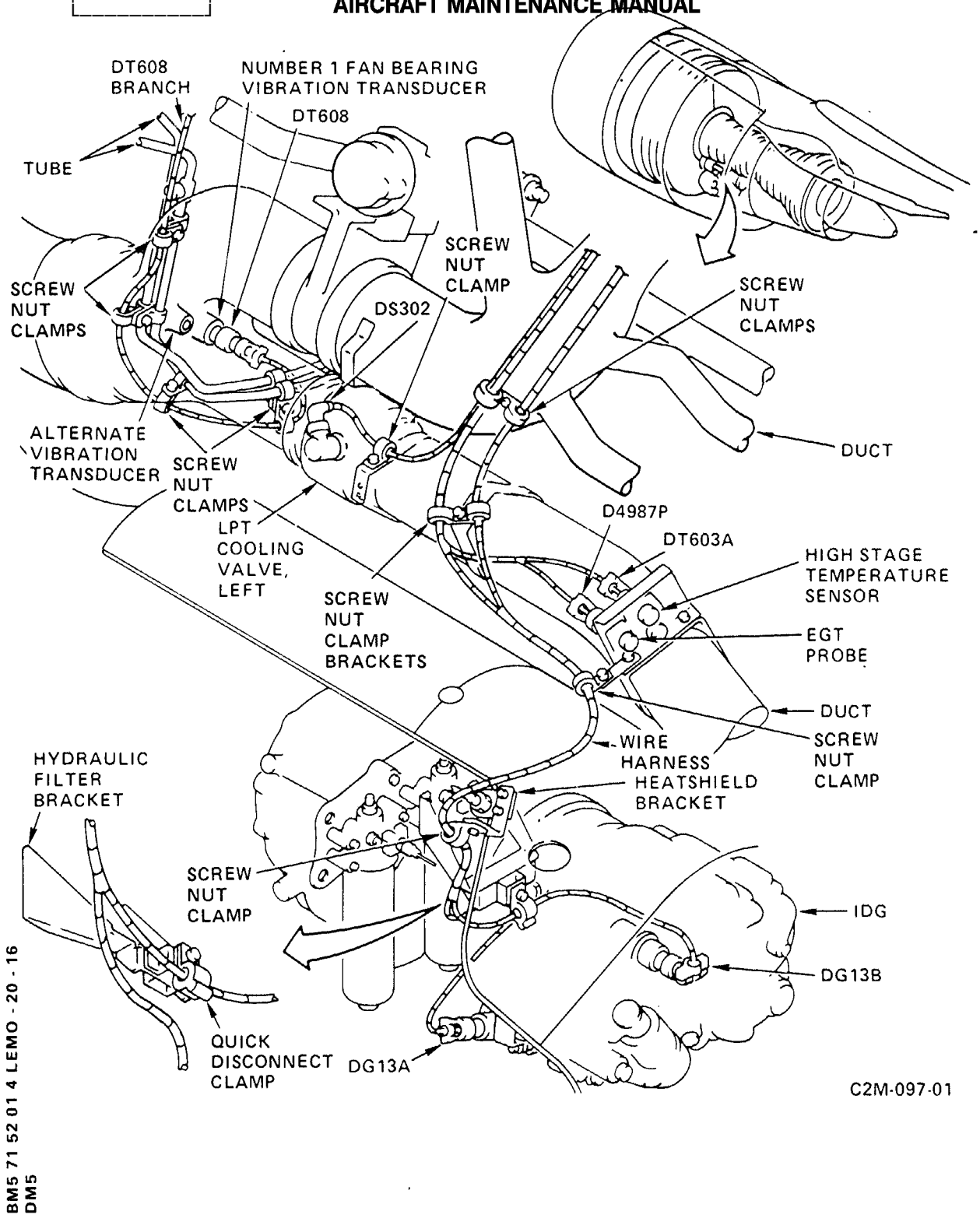
IDG Power Feeder Harness
(Post SB ROHR 24-015)
Figure 402



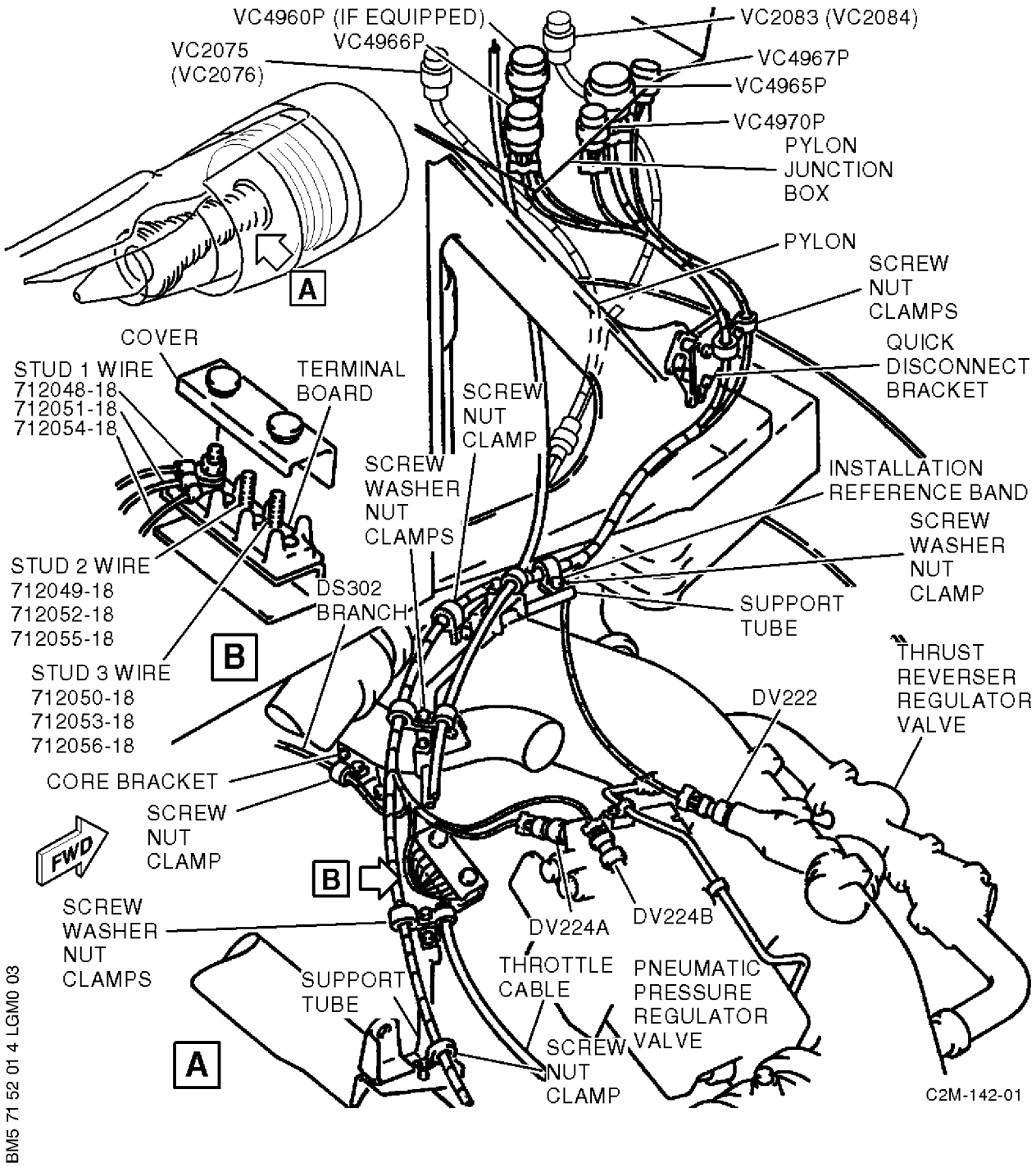
BM5 71 52 01 4 LCMO - 25 - 19
DM5

C2M-081-00

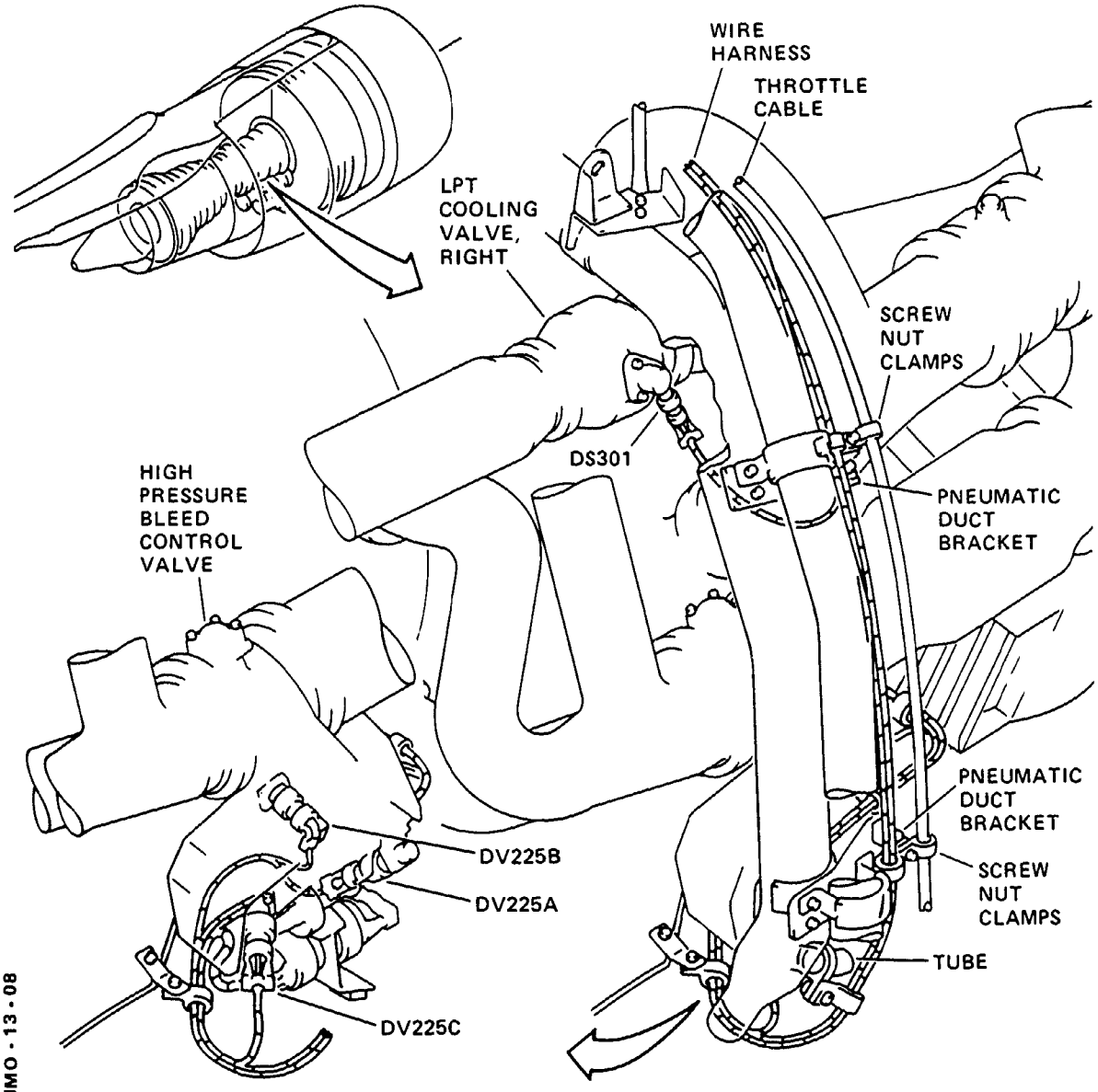
Left Core Wire Harness, Upper
Figure 403



Left Core Wire Harness, Lower
Figure 404

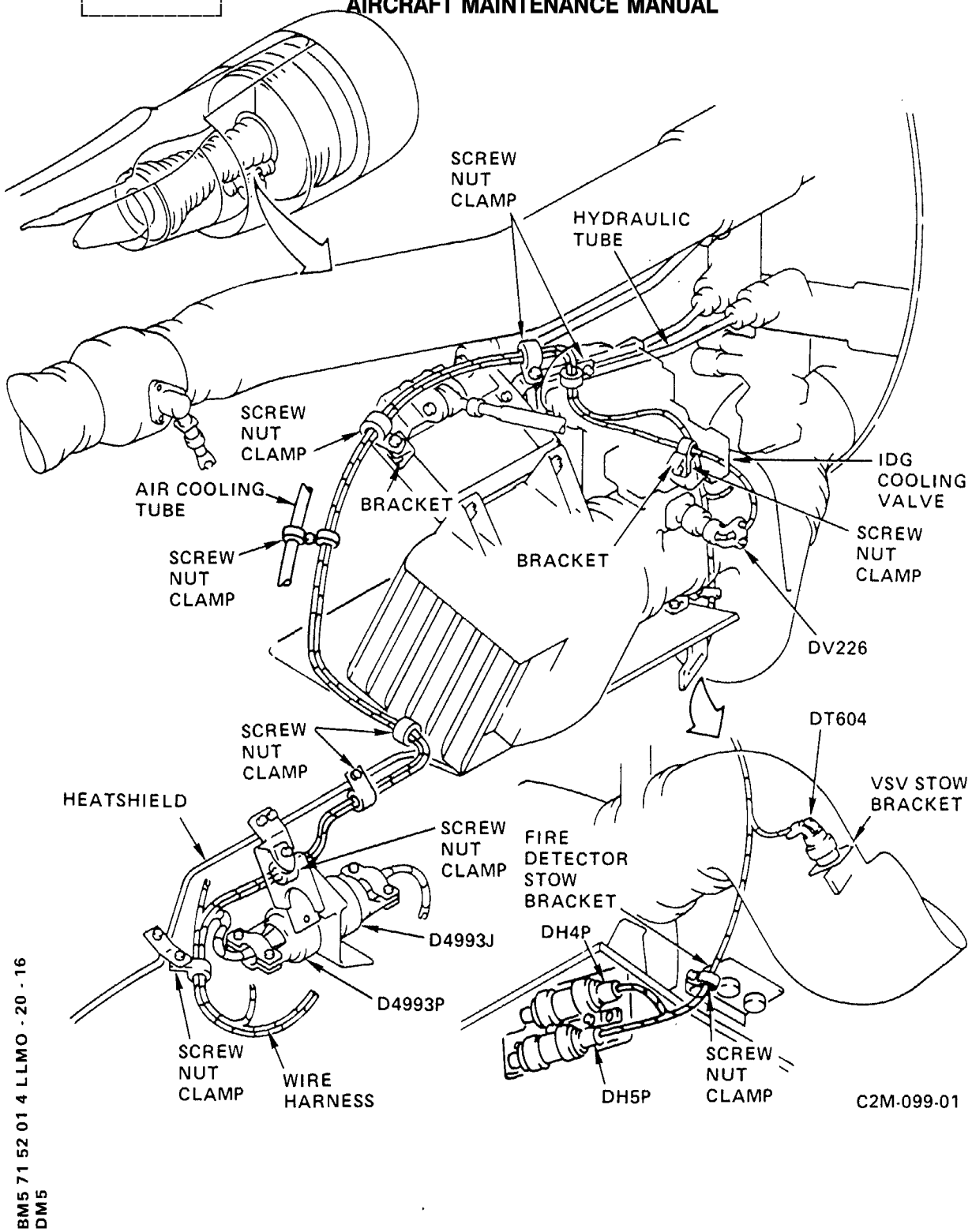


Right Core Wire Harness, Upper
Figure 405



BM5 71 52 01 4 LJMO.13.08
DM5

Right Core Wire Harness, Outboard
Figure 406



BM5 71 52 01 4 LLMO - 20 - 16
DM5

Right Core Wire Harness, Inboard
Figure 407

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ ENG 2/VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/ CONTROLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG 2/PUMP CTL		332/U57 thru U58

ACCESSORY DRIVE ZONE WIRE HARNESS - REMOVAL/INSTALLATION

1. General

A. This procedure provides instructions for removal and installation of the accessory drive zone wire harness.

B. Access to the wire harness is through thrust reverser doors. (Ref. 71-13-00, P. Block 301).

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench
C.	Caps
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)On panel 133VU, open, safety and tag all circuit breakers related to engines together with the following ones.

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H12
21VU	AIDS		105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 STICK SHAKR		109/A 2 thru A 5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG 1 & 2/SQUIB B		207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57

For ENGINE 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG1	3DN	322/N70

PANEL	SERVICE	IDENT.	LOCATION
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/V57 thru V58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

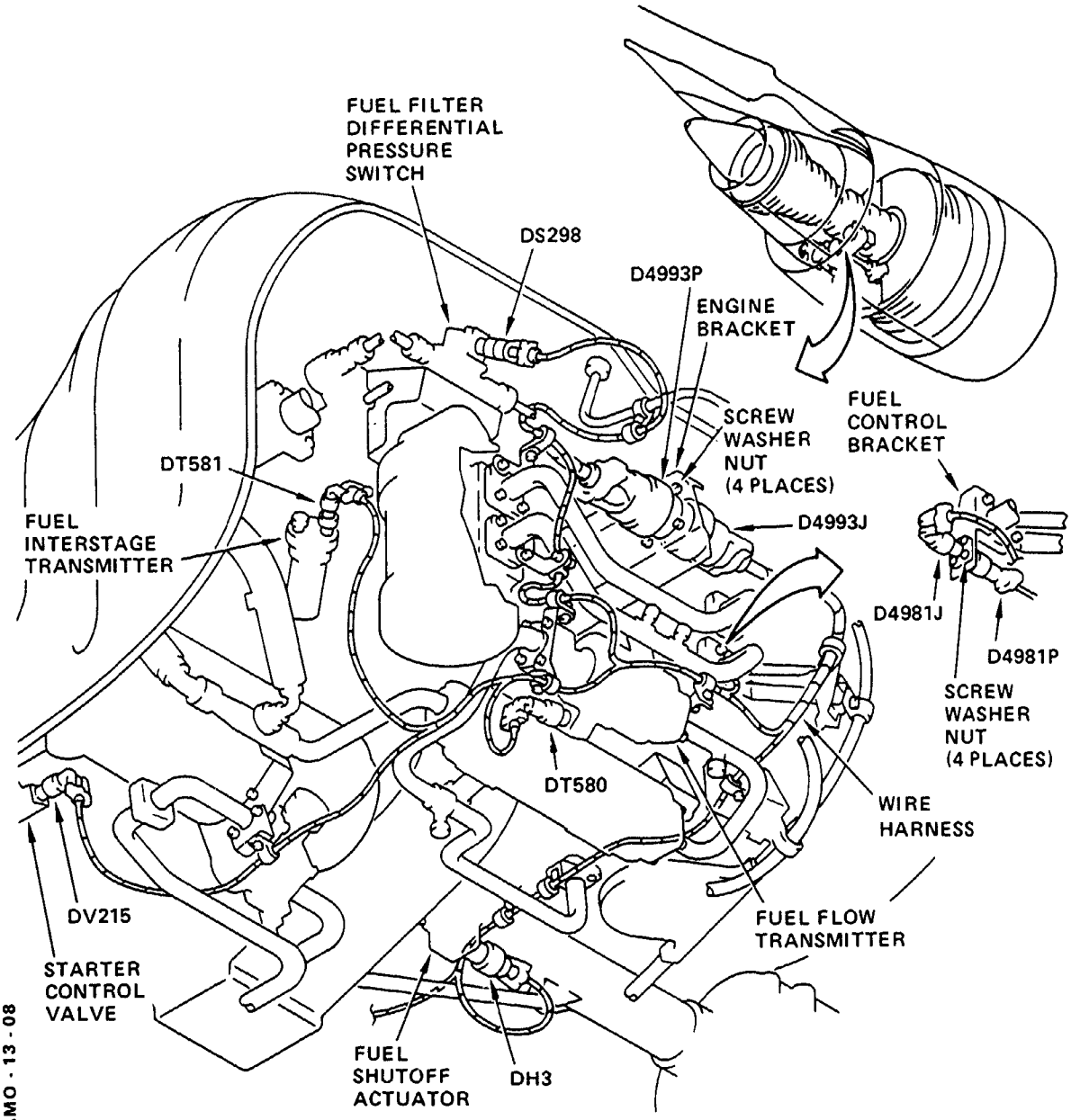
For ENGINE 2

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ENG 2/ VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/CONTROLLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG2/PUMP CTL		332/U57 thru U58

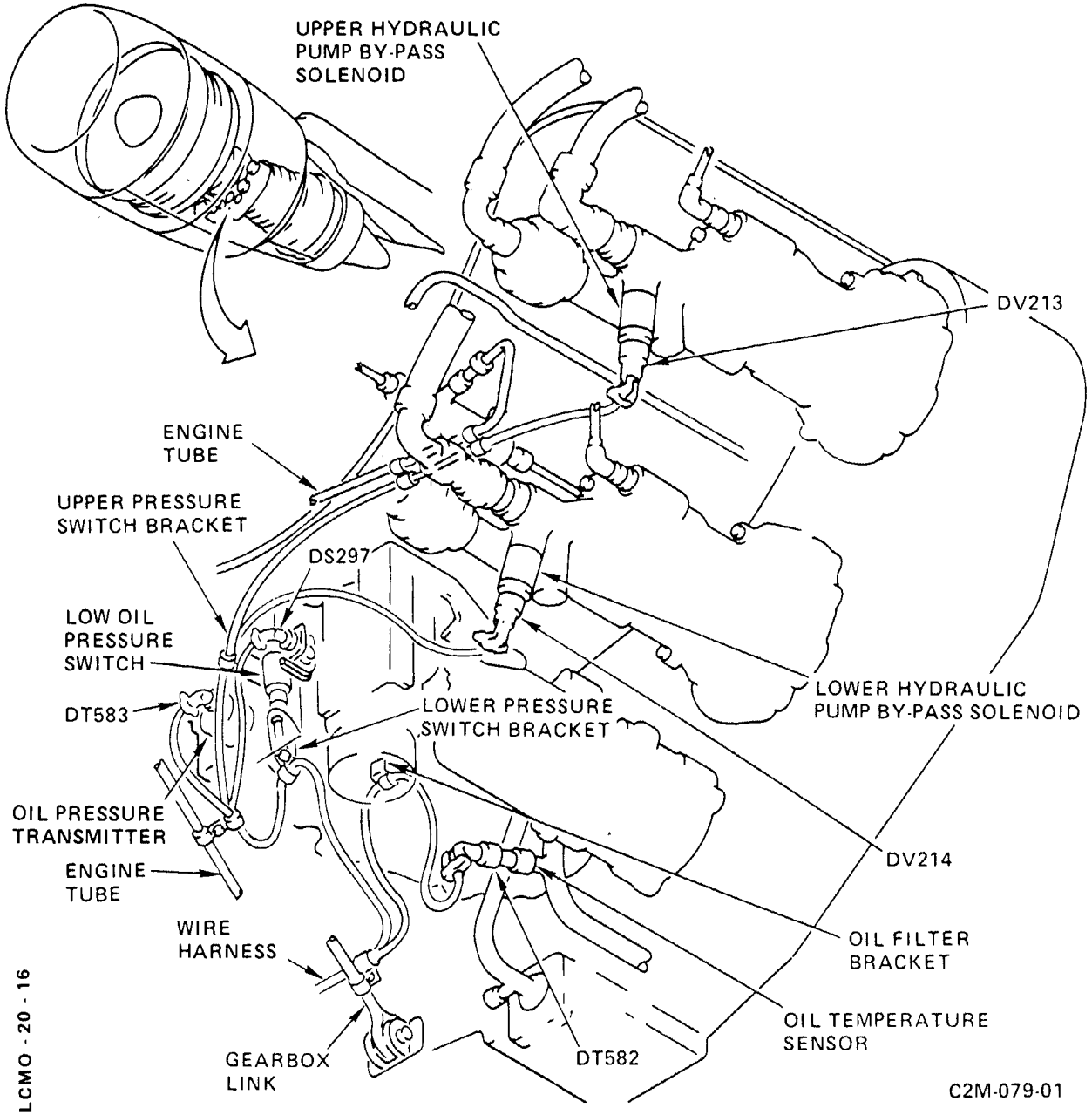
(2)Open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401, 402)
(1)Remove wire harness as follows :
(a)Disconnect electrical connector DS298 from fuel filter differential pressure switch, DT580 from fuel flow transmitter, DT581 from fuel interstage transmitter, DV215 from starter control valve, DH3 from fuel shutoff actuator, D4993P from D4993J, and D4981P from D4981J. Install protective covers on connectors and receptacles.
(b)Remove screws, washers, and nuts attaching electrical connectors D4993J and D4981J to engine and fuel control brackets.
(c)Remove screws, nuts, and clamps attaching harness to right side of accessory gearbox.
(d)Disconnect electrical connector DT582 from oil temperature sensor, DT583 from oil pressure transmitter, DS297 from low oil pressure switch, DV214 from lower hydraulic pump bypass solenoid, and DV213 from upper hydraulic pump bypass solenoid. Install protective covers on connectors and receptacles.
(e)Remove screws, nuts, and clamps attaching harness to left side of accessory gearbox and remove harness from engine.

C. Installation of Accessory Drive Zone Wire Harness.
(1)Install wire harness as follows :
(a)Position harness on right side of accessory gearbox and attach electrical connector D4993J to engine bracket with screws, washers, and nuts. TORQUE to between 8 and 10 lbf.in. (0.09 and 0.11 m.daN).
R (b)Attach electrical connector D4981J to fuel control bracket with screws, washers, and nuts. TORQUE to between 5 and 7 lbf.in. (0.06 and 0.08 m.daN).
(c)Connect electrical connector DS298 to fuel filter differential pressure
R switch, DT580 to fuel flow transmitter, DV215 to starter control valve,



Wire Harness, Accessory Gearbox, Right Side
Figure 401



Wire Harness, Accessory Gearbox, Left Side
Figure 402

DH3 to fuel shutoff actuator, D4993P to D4993J, and D4981P to D4981J. Tighten connectors fingertight plus one-eighth turn.

R (d)Connect electrical connector DT581 to fuel filter interstage
R transmitter. Tighten connector fingertight plus one-eighth turn.
R NOTE : Reclock right angle wire strain relief clamp of connector
R to allow a smooth routing flow from the connector to the
R first harness attachment clamp.
R (e)Attach harness to accessory gearbox with clamps, screws, and washers.
R (f)Position harness on left side of accessory gearbox.
R (g)Verify one interfacial seal is installed and connect electrical connector DT582 to oil temperature sensor, DV214 to lower hydraulic
R pump bypass solenoid and DV213 to upper hydraulic pump bypass solenoid.
R Tighten connectors fingertight plus one-eighth turn.
R NOTE : Reclock right angle wire strain relief clamp of connector
R to allow a smooth routing flow from the connector to the
R first harness attachment clamp.
R (h)Verify one interfacial seal is installed and connect electrical
R connector DT583 to oil pressure transmitter. Tighten connectors
R fingertight plus one-eighth turn.
R (i)Connect electrical connector DS297 to low oil pressure switch. Tighten connector fingertight plus one-eighth turn.
R (j)Attach harness to left side of accessory gearbox with clamps, screws, and nuts.
R (k)TORQUE all nuts to between 20 and 25 lbf.in. (0.23 and 0.28 m.daN).
R (l)Position right angle backshell of electrical connectors DT581, DT582, DV213, and DV214 as necessary for smooth wire routing from connector to first clamp.

D. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)Remove safety clips and tags and close the following circuit breakers :

- 133VU : All circuit breakers related to engine.

For ENGINE 1 & 2

PANEL	SERVICE	IDENT.	LOCATION
21VU	AFS/TCC		102/H 8 thru H12
21VU	AIDS		105/E 2 thru E 5
21VU	ECAM - NAVIGATION - ELEC		108/B 1 thru B13
21VU	SDAC - FWC2 STICK SHAKR		109/A 2 thru A 5 and A 8 thru A10
22VU	ELEC/DISC		206/D20 thru D21
22VU	N1		207/C15 thru C16
22VU	FIRE EXTING/ENG 1 & 2/SQUIB B		207/C19 thru C20
133VU	GEN 2/GCU/BACK UP SUPPLY		331/V81
133VU	HYDRAULIC/PTU CTL		332/U59 thru U60
133VU	HYDRAULIC/ELEC/PUMPS/WARN	4GE	331/V60
133VU	HYDRAULIC/ENG/PUMPS/WARN	5GD	333/T57

For ENGINE 1

PANEL	SERVICE	IDENT.	LOCATION
22VU	AIR BLEED/ENG 1/CONTROLLER		209/A17 thru A18
22VU	ENG FIRE DET/ENG 1		209/A19 thru A21
131VU	AIR BLEED & COMPT TEMP/VALVES/ ENG 1 VALVES		311/H53 thru H54
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG1	3DN	322/N70
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG1	1DN	321/P65
133VU	HYDRAULIC/ENG 1/PUMP CTL		331/V57 thru V58
133VU	FIRE VALVES/ENG 1	101GK	334/S57

For ENGINE 2

PANEL	SERVICE	IDENT.	LOCATION
22VU	ENG FIRE DET/ENG 2		209/A22 thru A24
131VU	AIR BLEED & COMPT TEMP/ENG 2/ VALVE/BLEED	12HA	311/H55
131VU	AIR BLEED & COMPT TEMP/ENG 2/VALVE		312/H53 thru H54
131VU	AIR BLEED & COMPT TEMP/ENG 2/CONTROLLER		315/D53 thru D54
132VU	ANTI ICE/ENG ANTI ICE/VALVE CTL/ENG 2	2DN	321/P66
132VU	ANTI ICE/ENG ANTI ICE/WARN/ENG 2	28DN	322/N71
133VU	ENG2/PUMP CTL		332/U57 thru U58

(3)Close fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301)

ENGINE DRAINS - DESCRIPTION AND OPERATION

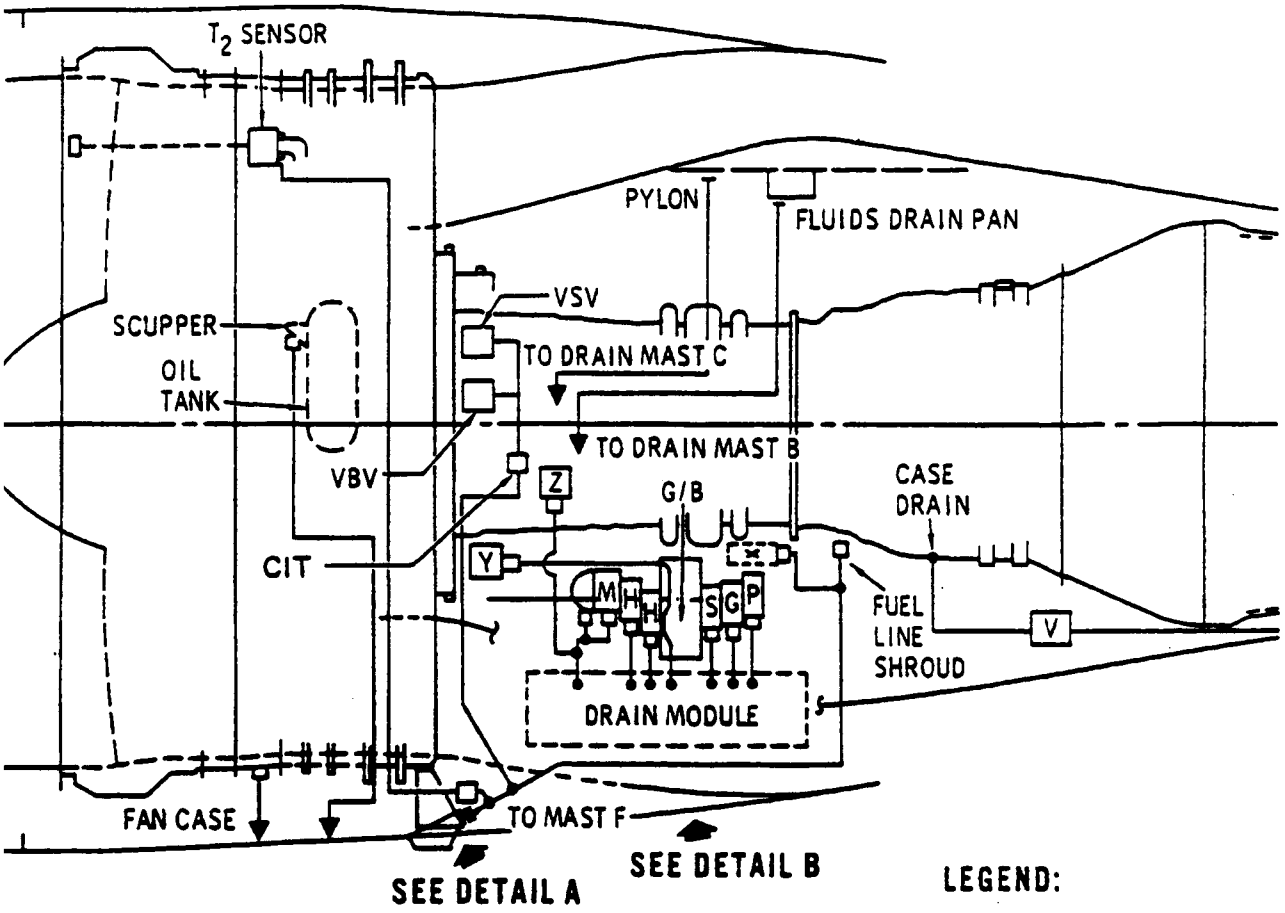
Pre SB GE 72-700 and 72-701

1. General (Ref. Fig. 001, 002)
End Pre SB GE 72-700 and 72-701
Post SB GE 72-700 and 72-701

1. General (Ref. Fig. 003, 004)
End Post SB GE 72-700 and 72-701
The drain system consists of lines collecting and carrying waste fluids overboard from the engine, accessories, nacelle cavities and pylon cavities. These drains carry fluids overboard from points where lines and accessories may leak and where fluid would tend to accumulate in a cavity.
Pre SB GE 72-700 and 72-701

2. Operation (Ref. Fig. 001)
The drain system is divided into three parts. One portion of the system retains drained fluids until expelled during flight. Another portion discharges fluids directly overboard through the drain mast. The third portion drains compartment cavities directly overboard to prevent any accumulation of spillage or condensate. The first type of drain is the accessory drive shaft drain. Seven shaft drains are routed to the drain module where they enter individual collection tanks. These small collectors are provisioned with manual drain valves that will allow ground maintenance inspection. Excess leakage that overflows from these inspection cavities goes into either oil or fuel general collection tanks. These general fuel and oil collection tanks collect leakages from the inspection cavities and retain normal leakage until the aircraft reaches a predetermined airspeed. A spring loaded valve, which is part of the module assembly, admits ram air (when the proper airspeed is reached) to evacuate the tanks and to discharge any accumulated fluid overboard through the drain mast. Drain valves in the bottom of each collector enable maintenance people to make a rapid determination of a leakage source while the aircraft is parked. Each collector is labeled to identify the accessory seal served.
End Pre SB GE 72-700 and 72-701
Post SB GE 72-700 and 72-701

2. Operation (Ref. Fig. 004)
The drain system is divided into two parts. One portion discharges fluids through the drain manifold and overboard through the drain mast. The second portion drains compartment cavities directly overboard to prevent any accumulation of spillage or condensation.
The drain manifold directs fluid leaks from six auxiliary drive pads to two ports within the drain mast. The manifold contains sampling plugs to provide ports within the drain mast. The manifold contains sampling plugs to provide leak isolation.
End Post SB GE 72-700 and 72-701
Pre SB GE 72-700 and 72-701



SHROUD DRAINS

VBV - VARIABLE BYPASS VALVE ACTUATOR
VSV - VARIABLE STATOR VANE ACTUATOR
FUEL NOZZLE SUPPLY
T_2 SENSOR - AIR INLET TEMPERATURE
N_1 SENSOR - FAN SPEED

1 FUEL DRAIN MANIFOLD ELIMINATED AND LINE PLUGGED BY SB GE 73-253

2 COMBUSTOR DRAIN VALVE ELIMINATED BY SB GE 73-0293

LEGEND:

A - AIR POPPET VALVE
B - FUEL DIRECT DRAIN
C - FUEL/OIL/WATER DIRECT DRAIN
D - FUEL COLLECT DRAIN
E - OIL COLLECT DRAIN
F - FUEL DIRECT DRAIN

SEAL DRAINS:
Y - N_1 SPEED SENSOR
G - IDG DRAIN
H - HYDRAULIC PUMP
M - MAIN ENGINE CONTROL
P - FUEL PUMP
S - STARTER

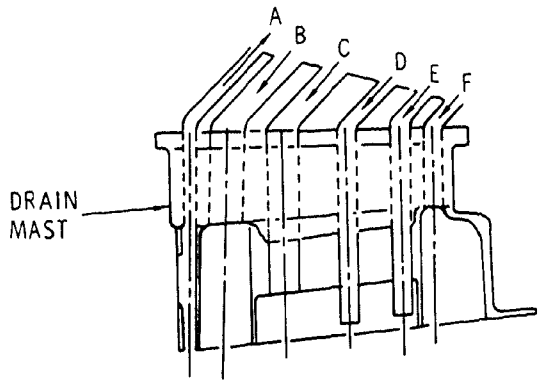
2 V - VALVE
X - IDG OIL COOLER (PRESSURE RELIEF)
Z - ACC SIGNAL VALVE
□ - KIT INTERFACE CONNECTIONS

1154627-00-A

BM5 71 70 00 0 LAM0 16

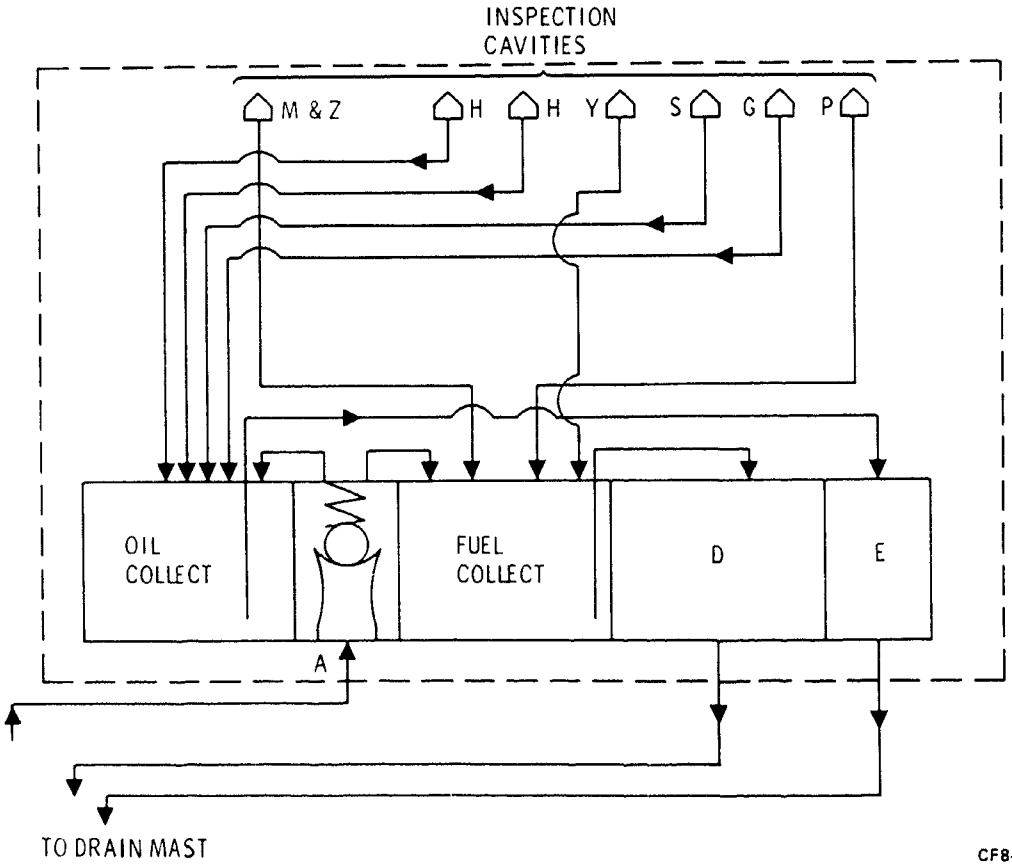
Schematic of Power plant Drain
(Pre SB GE 72-700 and 72-701)
Figure 001

DETAIL A



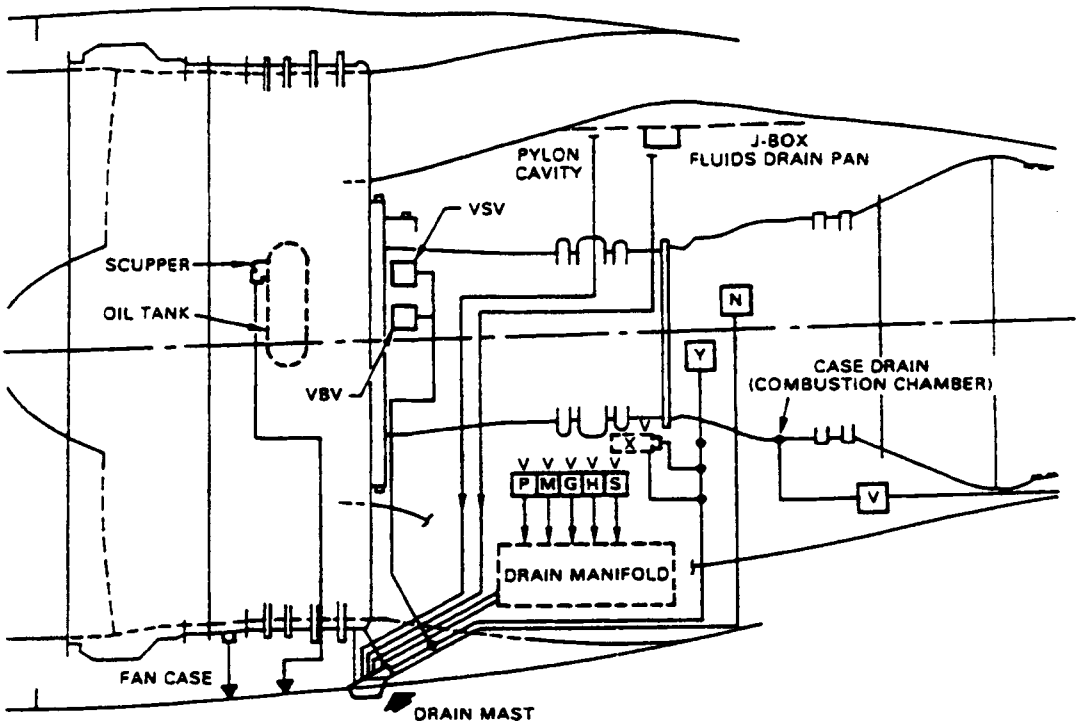
LEGEND:
SEE SHEET 1

DETAIL B



8M5 71 70 00 0 LCMO - 14 - 09
DM5

Drain System Detail
(Pre SB GE 72-700 and 72-701)
Figure 002



LEGEND :

- G - IDG DRAIN
- H - HYDRAULIC PUMPS (UPPER + LOWER)
- M - HYDROMECHANICAL UNIT
- N - FUEL NOZZLE MANIFOLD
- P - FUEL PUMP
- S - STARTER
- V - VALVE (COMBUSTOR DRAIN)
- VBV - VARIABLE BYPASS VALVE ACTUATOR
- VSV - VARIABLE STATOR VANE ACTUATOR
- X - IDG OIL COOLER (PRESSURE RELIEF)
- Y - HPT & LPT ACC VALVES
- □ - KIT INTERFACE CONNECTIONS

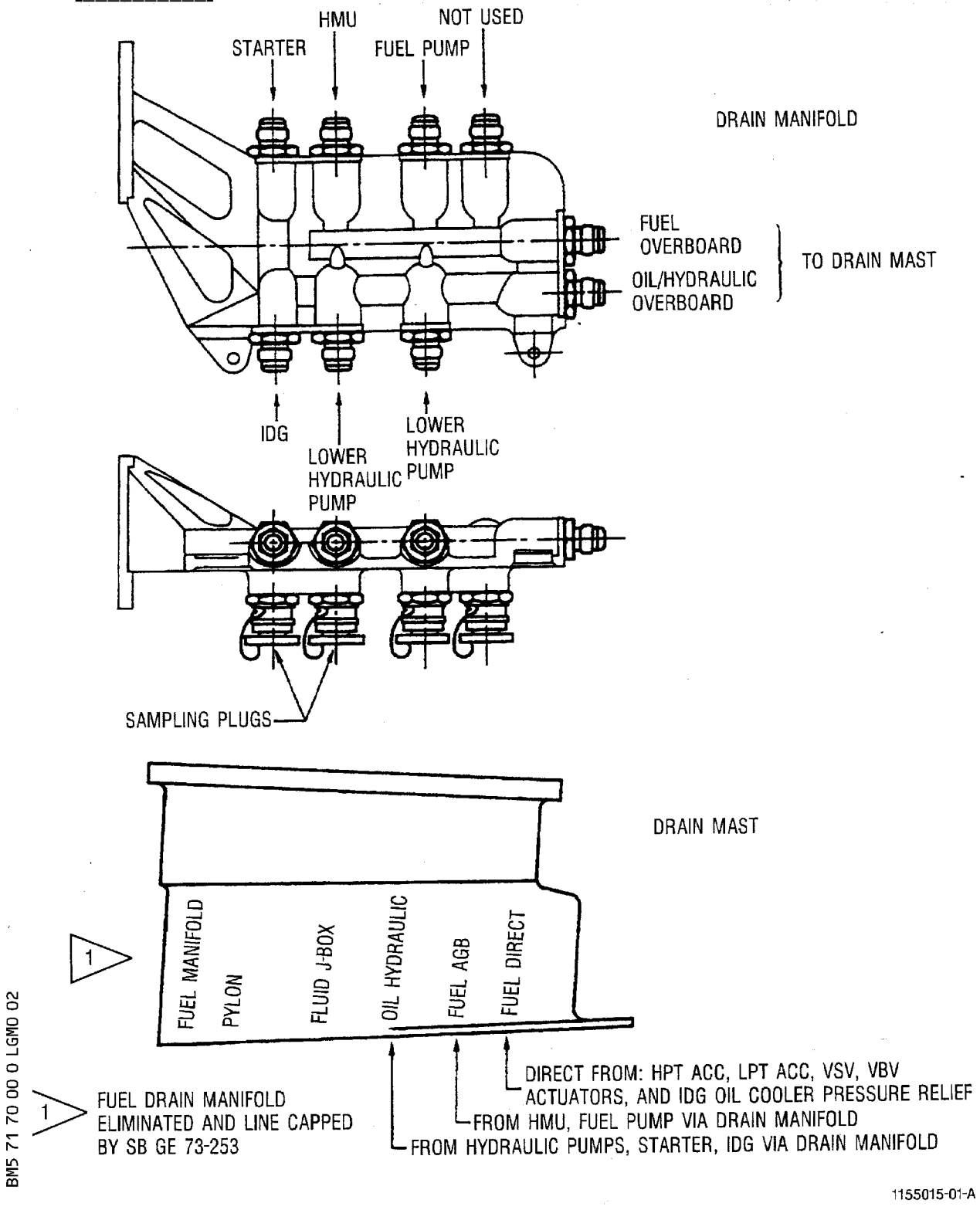
1 FUEL DRAIN MANIFOLD ELIMINATED AND LINE CAPPED BY SB GE 73-253

2 COMBUSTOR DRAIN VALVE ELIMINATED BY SB GE 73-0293

BM5 71 70 00 0 LEM0 02

1155010-00-A

Power Plant Drains - Schematic
(Post SB GE 72-700 and 72-701)
Figure 003



Drain Mast and Manifold
(Post SB GE 72-700 and 72-701)
Figure 004

3. Description

The drain module is mounted to the aft side of the engine gearbox and is connected with drain lines to the drain mast, which protrudes into the airstream.

Seven accessory shaft seal drains are piped to seven individual inspection collectors in the accessory drain module. Separate drain ports are provided for both hydraulic pumps, starter, integrated drive generator, fuel pump, fuel control and N1 speed sensor. The second type of drain is a drain line that carries leakage from a loosened coupling to the drain mast or other exit for overboard disposal. Drain lines are directly connected to the drain mast for the following :

- Variable bleed valve actuator fuel coupling shrouds
- Variable stator vane actuator fuel coupling shrouds
- Compressor inlet temperature sensor fuel line coupling shrouds
- Fuel nozzle feeder tube coupling shrouds
- Fluids junction box scupper drain
- Pylon cavity drain
- Engine inlet temperature sensor fuel line shrouds
- IDG oil line overpressure relief valve.

Pre SB GE 73-0293

A line from the combustion chamber enables fuel drainage, during engine shut down or aborted starts, and directs this fuel through the vent between the core cowl and exhaust nozzle to discharge overboard.

End Pre SB GE 73-0293

Drain port fittings are provided on the fan case to remove moisture from the acoustical panels. Drain fluids are then run overboard through the drain holes provided in the fan cowl doors.

An oil scupper with drain is provided to prevent any oil spillage/leakage at the oil tank filler cap from running onto the fan case (as when servicing the oil tank).

Following table lists the maximum acceptable leakage rate for fluid seals.

End Pre SB GE 72-700 and 72-701
Post SB GE 72-700 and 72-701

3. Description (Ref. Fig. 004)

The drain manifold is mounted to the aft side of the engine auxiliary gearbox and is connected by two drain lines to the drain mast, which protrudes into the airstream.

Other drain lines that carry leakages from loosened couplings to the drain mast or other exit for overboard disposal. Drain lines are directly connected to the drain mast for the following :

- Variable bleed valve actuator fuel coupling shrouds
- Variable stator vane actuator fuel coupling shrouds

Pre SB GE 73-253

- Fuel nozzle manifold

End Pre SB GE 73-253

- Fluids junction box scupper drain (fuel and hydraulic fluids)
- Turbine case coding control values (fuel)
- Pylon cavity drain (fuel)
- IDG oil line overpressure relief valve (oil).

Pre SB GE 73-0293

A line from the combustion chamber enables fuel drainage, during engine shut down or aborted starts, and directs this fuel through the vent between the core cowl and primary nozzle to discharge overboard.

End Pre SB GE 73-0293

Drain port fittings are provided on the fan case to remove moisture from the acoustic panels. Drain fluids are then run overboard through the drain holes provided in the fan cowl doors.

An oil supper with drain is provided to prevent any oil spillage/leakage at the oil tank filler cap from running onto the fan case (as when servicing the oil tank).

End Post SB GE 72-700 and 72-701

A. List of the Maximum Acceptable Leakage Rates (Ref. 71-70-00, P. Block 601).

ENGINE VENTS AND DRAINS - MAINTENANCE PRACTICES (PYLON DRAIN CLEARING)

1. General

This section provides instructions for clearing the forward and aft pylon drains. Pylon drain clearing may be facilited if accomplished when drains are accessible during performance of other maintenance.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C.	Regulated Air Pressure Supply
D. Material No.C04-002	Cleaning Compounds and Solvents (Ref. 70-00-00)
E. Material No.C04-018	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1)Open, safety and tag the circuit breakers for the appropriate engine and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(2)Install access platform.

B. Clear the left side junction box oil drain tube as follows : (Ref. Fig. 201)

(1)Disconnect the flexible hoses on the oil drain tube from the nipple at the junction box.

(2)Disconnect the oil drain tube from the lower drain tube at the heat shield bracket.

NOTE : Reposition fitting of the upper oil drain tube out of the alignment with the lower tube section to avoid blowing debri into the lower tube sections.

WARNING : DO NOT APPLY AIR PRESSURE TO THE UNION NUT WHEN PERSONNEL ARE IN THE AFFECTED AREA.

(3)Use 25 to 35 PSIG (1.724 to 2.413 bars) regulated air supply, clear the upper oil drain tube section of any loose debri, and to check for blockage due to coking of fluids in the high temperature zone.

(4)Inspect the oil drain tube for dents and other damage.

(5)If the oil drain tube section is cleared by using air pressure connect flexible hose to nipple at junction box and TORQUE to between 450 and 550 lbf.in. (5.08 and 6.21 m.daN). Connect the oil drain tube to the lower drain tube section and TORQUE to between 450 and 550 lbf.in. (5.08 and 6.21 m.daN).

NOTE : If not cleared by air pressure, proceed to paragraph D.

C. Clear the right side pylon drain tube as follows :

(Ref. Fig. 202)

(1)Disconnect drain hose on the pylon drain line from the pylon disconnect tray.

(2)Disconnect pylon drain tube from the lower drain tube.

NOTE : Repositioning fitting of upper oil drain tube out of alignment with lower tube section.

WARNING : DO NOT APPLY AIR PRESSURE TO THE UNION NUT WHEN PERSONNEL ARE IN THE AFFECTED AREA.

(3)Use 25 to 35 PSIG regulated air supply, clear the upper oil drain tube section.

(4)Inspect drain line for dents and other damage.

(5)If drain line section is cleared by using air pressure, connect the drain hose to the drain tube and pylon disconnect tray. TORQUE the nut to between 900 and 1100 lbf.in. (10.2 and 12.4 m.daN).

NOTE : If not cleared by air pressure, proceed to paragraph D.

D. Clean the drain tubes and hoses as follows :

The following equipment is required for the application of this process :

(1)Safety equipment and devices such as : eye-bath breathing apparatus and fire equipment.

(2)Processing plant for neutralizing waste and used solutions.

(3)Efficient ventilation system for extracting and neutralizing vapors.

(4)Remove the left side J-box oil drain tube as follows :

(a)Disconnect the drain tube at both ends.

(b)Remove the two bolts, washers, nuts and clamps that secure the drain tube to the HPT air supply tube and LPT air supply tube.

(c)Remove the two bolts, nuts and clamps that secure the drain tube to the active clearance control tube.

(5)Remove the right side pylon drain tube as follows :

(a)Disconnect the upper pylon drain hose at both ends.

(b)Remove jamnut and disconnect the upper pylon drain tube from the lower drain tube.

(c)Remove the three bolts, nuts, clamps, and two washers that secure the drain tube to the air tube.

(6)Cap one end of the drain tube to be cleared.

WARNING : MATERIAL No.C04-002 AND C04-018 ARE FLAMMABLE. DO NOT USE NEAR WELDING AREAS, NEAR OPEN FLAMES OR ON VERY HOT SURFACES. USE ONLY WITH ADEQUATE VENTILATION. AVOID PROLONGED OR REPEATED BREATHING OF VAPORS. DO NOT SMOKE WHEN USING IT. USE PROTECTIVE CREAMS. WEAR APRON AND GOGGLES (OR FACE SHIELD) TO PROTECT EYES AND SKIN. STORE IN APPROVED METAL SAFETY CONTAINERS.

(7)Fill the tube with stoddard Material No.C04-002 or Material No.C04-018 and cap the tube.

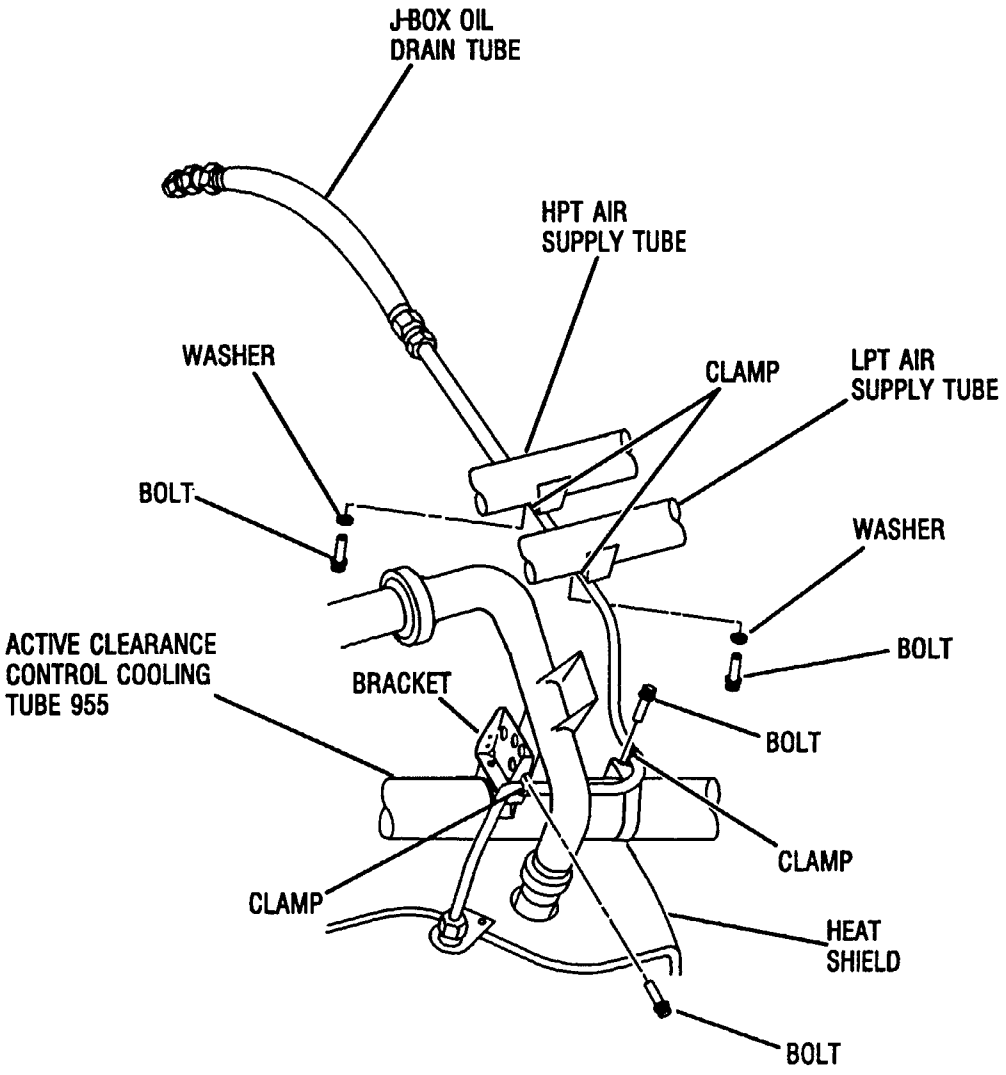
(8)Let the tube soak for about one hour.

(9)Remove the cap and drain the solvent and coke mixture into a bucket.

(10)Use a piece of cloth or brush attached to a long rod or heavy wire to remove traces of coke residue and solvent from the full length of the tube.

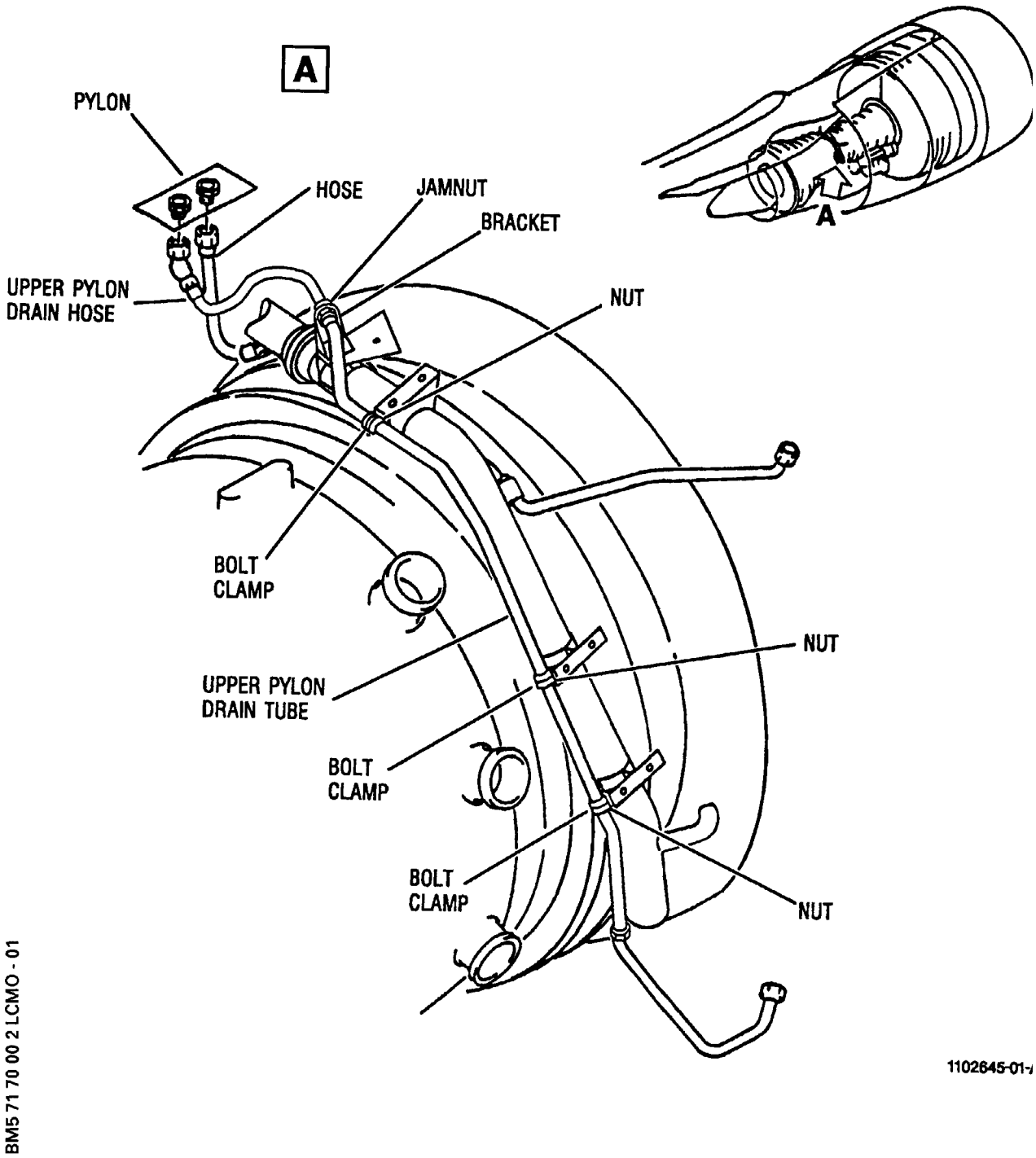
(11)Blow dry the tube with clean shop air.

(12)Repeat steps (4) through (9) if tube is not cleared.



BM5 71 70 00 2 LAMO - 01

Junction Box Oil Drain Tube
Figure 201



Right Side Pylon Drain Tube
Figure 202

(13)Install the left side junction box oil drain tube as follows :
(a)Put oil drain tube in position on the left side of the engine. Loosely connect the oil drain tube to the lower drain tube.
(b)Attach the oil drain tube to the brackets on the HPT air supply tube and the LPT air supply tube. Use two bolts, nuts, washers, and clamps. TORQUE the nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).
(c)Attach the oil drain tube to the active clearance control cooling tube with bolt, nut, and clamp. TORQUE the nut to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).
(d)Attach the oil drain tube to the side of the bracket with bolt, nut, and clamp. TORQUE the nut to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).
(e)Connect the hose end of the drain tube to nipple. TORQUE the nut to between 450 and 550 lbf.in. (5.08 and 6.21 m.daN).
(f)TORQUE the oil drain tube connection at the lower drain tube to between 450 and 550 lbf.in. (5.08 and 6.21 m.daN).
(14)Install the right side pylon drain tube as follows :
(a)Put the pylon drain tube in position on the right side of the engine. Install the upper end of the tube in bracket and loosely connect the lower end to the lower drain tube. Loosely install the jamnut on the drain tube.
(b)Attach the drain tube to the bracket with bolt, nut, and clamp. Attach the drain tube to the two brackets on the air tube with two bolts, nuts, washers, and clamps. TORQUE the nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).
(c)TORQUE the drain tube connection at the lower drain tube to between 900 and 1100 lbf.in. (10.2 and 12.4 m.daN).
(d)TORQUE the jamnut to between 540 and 600 lbf.in. (6.10 and 6.78 m.daN).
(e)Connect the drain hose to the drain tube and pylon disconnect tray. TORQUE the nut to between 900 and 1100 lbf.in. (10.2 and 12.4 m.daN).

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.
(3)Remove safety clips and tags and close circuit breakers for the appropriate engine. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).

ENGINE VENTS AND DRAINS - INSPECTION/CHECK

1. General

A. This procedure gives inspection conditions for fluid leakage from engine components and strut compartments connected to the drain system. Correction instructions for unwanted leakage are also given.

Pre SB GE 72-700 and 72-701

B. Most of the accessory and component drains are connected to the drain module. At the drain module, each drain drains into a different drain cavity, where the fluid is kept during ground operation. To find the leakage rate for these drains, the following must be done :

(1) Open the manual bleed valves to drain the remaining fluids from the drain cavities.

(2) Operate the engine at idle power or takeoff power (as required) and write the quantity of time the engine is operated.

(3) Drain the fluids from the drain cavities into containers and measure the quantity collected.

(4) Find the leakage rate from the quantity of fluid collected and the written time of engine operation.

End Pre SB GE 72-700 and 72-701

Post SB GE 72-700 and 72-701

B. Each accessory drive pad is routed to the drain manifold. To determine the leakage rate for these drains, the following must be performed :

(1) Push and turn fittings on the drain manifold by a quarter turn ; check for evidence of fuel/oil leakage.

(2) For each location which exhibits evidence of fuel/oil leakage, disconnect the drain line upstream of the manifold and attach a suitable container to collect fluid.

(3) Operate the engine at idle power or takeoff power (as required) and record the engine operation time.

(4) Measure the volume of collected fluids from the drain manifold (oil and fuel) into containers.

(5) Calculate the leakage rate from the quantity of collected fluid and the recorded engine operation time.

End Post SB GE 72-700 and 72-701

C. Leakage from drains connected directly to the drain mast can be measured by counting the drops from the drain mast after engine operation at idle power.

R CAUTION : CAPPING OF DRAINS THAT ARE LEAKING FUEL IS NOT PERMITTED. DO NOT
R DO MORE THAN THE MAXIMUM CYCLE LIMITATION WITH CAPPED DRAINS.
R CAPPED DRAINS CAUSE FLUID TO COLLECT IN THE SEAL DRAIN CAVITY.
R THIS CAN CAUSE MORE SEAL FAILURE AND CONTAMINATION OF THE ENGINE
R OIL AND/OR ACCESSORIES. UNWANTED FLUID LEVELS IN THE SEAL DRAIN
R CAVITY CAN CAUSE LEAKAGE INSIDE THE COWLING.

Pre SB GE 72-700 and 72-701

D. Some accessory pad drains and the hydromechanical N1 speed sensor drain can

be capped. The drain line is disconnected from the drain pad port and both the port and the line are capped for a maximum of 10 cycles under the following conditions. Replace seals that leak as soon as possible.

End Pre SB GE 72-700 and 72-701

Post SB GE 72-700 and 72-701

D. The accessory pad drains can be capped. The drain line is disconnected from the drain pad port and both the port and the line are capped for a maximum of 10 cycles under the following conditions. Replace seals where leakage was found as soon as possible.

End Post SB GE 72-700 and 72-701

(1)Starter Drive Pad Drain - the drain can be capped.

(2)Integrated Drive Generator (IDG) Pad Drain - the drain can be capped only if oil leakage is apparent from the accessory gearbox carbon seal. Examine the IDG oil level to make sure oil leakage is not from the IDG (Ref. 24-11-00, P. Block 601).

(3)Hydraulic Pump Drive Pad Drain - if hydraulic fluid leakage is above the allowable limits, replace the pump (Ref. 29-11-32, P. Block 401). If engine oil leakage is above the allowable limits, then stop leakage by replacing the accessory gearbox seal (Ref. 72-65-00, P. Block 801).

(4)Fuel Pump Drive Pad Drain - stop leakage with a plug if oil is apparent.

(5)Main Engine Control (MEC) Drive Pad Drain - stop leakage with a plug if oil is apparent.

(6)Hydro-mechanical N1 Speed Sensor - stop leakage with a plug if oil is apparent.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform
B.	Circuit Breaker Safety Clips
C.	Regulated Air Pressure Supply
D. Container	1 gallon (4 liter) capacity, applicable for fuel and oil, local purchase
E. Container	1 cup (250 cc) capacity, applicable for fuel and oil, local purchase (quantity necessary to isolate drain sources)
F. Cylinder	Graduated, 250 cc capacity, 1 cc increments, applicable for fuel and oil, local purchase
Referenced Procedures	
- 24-11-00, P. Block 301	IDG System
- 24-11-00, P. Block 601	IDG System
- 24-11-11, P. Block 401	IDG
- 24-11-21, P. Block 401	Air/Oil Heat Exchanger (IDG)
R - 29-00-00, P. Block 601	General
- 29-11-32, P. Block 401	Engine Pump
- 71-00-00, P. Block 401	General
- 71-00-00, P. Block 501	General
- 71-13-00, P. Block 301	Cowl Doors
- 72-00-00, P. Block 601	Engine - General

ITEM	DESIGNATION
- 72-60-01, P. Block 401	N1 Control Adapter Assembly
- 72-65-00, P. Block 801	Gearbox Assembly
- 73-12-01, P. Block 401	Fuel Pump
- 73-13-01, P. Block 401	Fuel Nozzles
- 73-21-01, P. Block 401	MEC
- 73-21-07, P. Block 401	N1 Speed Sensor (Hydro-Mech)
- 75-23-02, P. Block 401	Active Clearance Control Signal Valve
- 75-31-01, P. Block 401	Variable Stator Vane Feedback Cable
- 75-32-04, P. Block 401	Variable Bypass Valve Feedback Cable
- 80-13-01, P. Block 401	Pneumatic Starter

3. Engine Drain Inspection and Leakage Isolation

A. Examine for leaks
(1)Open the left thrust reverser half (Ref. 71-13-00, P. Block 301).
(2)Do an initial inspection of the drain mast, inside the cowling, and the accessory gearbox, for evidence of leakage.
(3)Put a one-gallon (4 liter) container below the drain module.
(4)Push the manual bleed valve to drain each drain cavity.
(5)Check for evidence of fluid leaks at each part of the drain manifold.
(6)If you see fluid, measure the leakage and leakage rate as follows :
NOTE : There can be an indication of oil loss with no external indication of oil leakage. This can be an indication of carbon seal leakage.
(7)Close the left thrust reverser half (Ref. 71-13-00, P. Block 301).
(8)Put a one-gallon (4 liter) container below the drain mast.
(9)Prepare and start the engine as instructed for usual engine operation (Ref. 71-00-00, P. Block 501).
(a)Let the engine become stable at idle, then increase the thrust lever to takeoff power target (Ref. 71-00-00, P. Block 501) for five minutes.
R Return engine to idle after five minutes.
(b)Examine the drain mast for dripping fluid. If dripping fluid is seen, identify the location of leakage and make a record of the number of drops during the time of engine operation.
(c)Make a record of the time the engine operates.
(10)Stop the engine as instructed for usual engine operation (Ref. 71-00-00, P. Block 501).
(11)Open the thrust reverser halves (Ref. 71-13-00, P. Block 301).
(12)Visually examine the accessory gearbox, the hydro-mechanical N1 control adapter mounting flange, and the drain mast for signs of fluid.
(13)If the visual check does not reveal signs of obvious leakage, and no leakage was evidenced at the drain mast during engine run, no further action is required.
Pre SB GE 72-700 and 72-701
(14)Push each manual bleed valve on the drain module, one at a time. Let the fluid drain from the drain cavity into a graduated cylinder.
End Pre SB GE 72-700 and 72-701
(15)From the time record of engine operation, find the leakage rate.

(16)Make sure the leakage rate is not more than the limits shown in the table (Part B).
(17)If the leakage rate is more than the limits, isolate the source of the leak as follows :
NOTE : Some drain lines are connected to more than one component. If leakage is apparent from this type of drain line, the source of the leakage must be isolated.

Pre SB GE 72-700 and 72-701
(a)Disconnect the drain line from all the source components.
End Pre SB GE 72-700 and 72-701
Post SB GE 72-700 and 72-701
(a)Remove the sampling plug from the drain manifold of the suspected leaking component or disconnect the drain line from the suspected source component.
End Post SB GE 72-700 and 72-701
(b)Put a one-cup (250 cc) container below each source component. Make sure the containers will not touch the closed cowls or thrust reverser halves.
(c)Close the thrust reverser halves, as applicable (Ref. 71-13-00, P. Block 301).
(d)Prepare and start the engine as instructed for usual engine operation (Ref. 71-00-00, P. Block 501).
(e)Let the engine become stable at ground idle and make a record of the amount of time the engine operates.
(f)Stop the engine as instructed for usual engine operation (Ref. 71-00-00, P. Block 501).
(g)Open the thrust reverser halves, as applicable (Ref. 71-13-00, P. Block 301).
(h)Remove the containers at each component.
(j)Measure the fluid quantity in each container with a graduated cylinder.
(k)From the time record of engine operation, find the leakage rate of each component.

Pre SB GE 72-700 and 72-701
(l)Connect all the disconnected drain tubes.
End Pre SB GE 72-700 and 72-701
Post SB GE 72-700 and 72-701
(l)Connect all the disconnect drain tubes or sampling plugs.
End Post SB GE 72-700 and 72-701
(18)Correct all leakage problems.
(19)Close the thrust reverser halves, as applicable (Ref. 71-13-00, P. Block 301).

B. Maximum Acceptable Leakage Rates
NOTE : (Ref. Fig. 601, 602)

**ON A/C 001-100,

Post SB 72-2029 For A/C 001-100,

B. Maximum Acceptable Leakage Rates
NOTE : (Ref. Fig. 601, 603)

**ON A/C 001-100,

NOTE : Fuel components that have Fluorocarbon (Viton) external seals (SB 73-079) can leak for a short period of time when they are below -29°F (-34°C). If a leak occurs, continue the start to idle. After 5 minutes at idle, external leakage is not permitted and maximum drainage rates apply.

	DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
	Strut	Any	Normally dry. Liquid drainage shows leakage in a strut contained system.	Examine the plumbing in the strut for leaks. Repair as necessary.
	Oil Tank Scupper	Oil	Service spillage only.	Examine the oil tank cap to be sure it is correctly installed. Do not spill oil during servicing.
	Pre SB GE 73-253 Fuel Manifold	Fuel	None	Do a drain shroud and drain manifold leak check (Ref. 73-13-01, P. Block 401).
	End Pre SB GE 73-253 Post SB SB GE 73-253			
R	Fuel Manifold	Fuel	None	Do a drain shroud leak check (Ref. 73-13-01, P. Block 401).
	End Post SB GE 73-253			
	Integrated Drive Generator (IDG)	Oil	5 cc/hr (2 drops/minute)	Do an IDG pressurized leak check (Ref. 24-11-00, P. Block 601). If IDG leakage is more than the limits, replace the IDG (Ref. 24-11-11, P. Block 401) IDG

DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
			leakage is in limits, replace the IDG drive pad carbon seal (Ref. 24-11-00, P. Block 301).
IDG Pressure Relief Valve	Oil	None	Examine the IDG pressure relief valve (Ref. 24-11-00, P. Block 601).
	Fuel	None	Replace the IDG fuel/oil heat exchanger (Ref. 24-11-21, P. Block 401).
IDG Overtemperature Case Drain	Oil	None	Replace the IDG (Ref. 24-11-11, P. Block 401).
Fuel Pump Drive Pad	Fuel	180 cc/hr (72 drops/minute)	Replace the fuel pump (Ref. 73-12-01, P. Block 401).
	Oil	5 cc/hr (2 drops/minute)	Replace the fuel pump drive pad carbon seal (Ref. 72-65-00, P. Block 801).
Main Engine Control (MEC) Drive Pad	Fuel	120 cc/hr (48 drops/minute)	Replace the MEC (Ref. 73-21-01, P. Block 401). Engines with line replaceable MEC drive spline assemblies, post SB GE 73-0041, replace MEC drive spline assembly (Ref. 73-21-01, P. Block 801)
	Oil	5 cc/hr (2 drops/minute)	Replace the MEC drive pad seal (Ref. 72-65-00, P. Block 801).
Starter Drive	Oil	5 cc/hr	Remove the starter

DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
Pad		(2 drops/minute)	(Ref. 80-13-01, P. Block 401) and examine the O-ring on the starter drive shaft for damage and make sure it is there. Replace the O-ring if it is damaged or not there and install the starter. If the O-ring is not damaged and is there, replace the drive pad carbon seal (Ref. 72-65-00, P. Block 801).
Hydraulic Pump Drive Pad	Hydraulic fluid	For allowable leakage (Ref. 29-00-00, P. Block 601)	Replace the engine driven pump (Ref. 29-11-32, P. Block 401).
	Oil	5 cc/hr (2 drops/minute)	Replace the hydraulic pump drive pad carbon seal (Ref. 72-65-00, P. Block 801).
Active Clearance Control Signal Valve	Fuel	60 cc/hr (24 drops/minute)	Replace the active clearance control signal valve (Ref. 75-23-02, P. Block 401).
Hydromechanical N1 Speed Sensor	Fuel	20 cc/hr (8 drops/minute)	Examine the tube connections for damage or looseness on the hydromechanical N1 speed sensor. If the tube connections are satisfactory, replace the hydromechanical N1 speed sensor. (Ref. 73-21-07, P. Block 401).
	Oil	5 cc/hr	Replace the N1

DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
		(2 drops/minute)	control adapter (Ref. 72-60-01, P. Block 401).
Hydromechanical Fan Inlet Temperature (T2) Sensor	Fuel	None	Examine for loose or damaged tube connections at the T2 sensor.
VSV Actuator	Fuel	90 cc/hr (35 drops/minute)	Examine for a loose or damaged rod end tube connection (and the head end tube connection on engines with rod and head end drain tubes) at the VSV actuator. If the tube connection is not loose or damaged, replace the VSV actuator (Ref. 75-31-01, P. Block 401).
VBV Actuator	Fuel	90 cc/hr (35 drops/minute)	Examine for a loose or damaged rod end tube connection (and the head end tube connection on engines with rod and head end drain tubes) at the VBV actuator. If the tube connection is not loose or damaged, replace the VBV actuator (Ref. 75-32-04, P. Block 401).
A Sump	Oil	Trace	(See NOTE 1)
Number 6 Compressor Rear Frame (CRF) Strut (6 o'clock)	Oil	Oil Wetting	Any amount is serviceable if engine oil use is in limits (Ref. 71-00-00, P. Block 501).
R			
R			Optional (If the oil

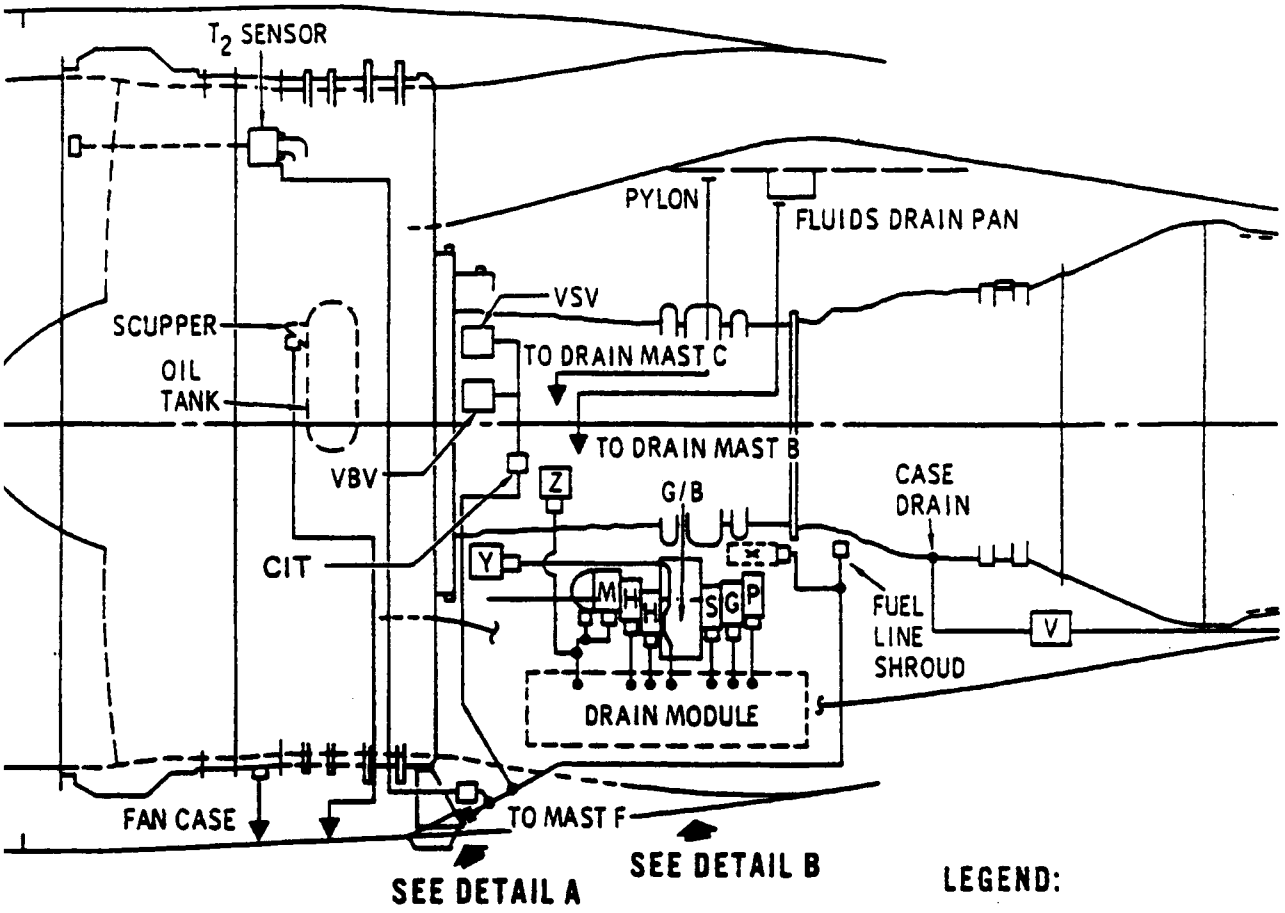
	DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
R				use is in the limits) : Do a borescope inspection of the CRF to find the source of oil wetting (Ref. 72-00-00, P. Block 601). If the oil use is more than the limits (Ref. 71-00-00, P. Block 501), replace the engine (Ref. 71-00-00, P. Block 401).
	LP Recoup Tubing	Oil	Oil Wetting	Any amount is serviceable if engine oil use is in limits (Ref. 71-00-00, P. Block 501).
R				Optional (If the oil use is in the limits) : Do a borescope inspection of the CRF to find the source of oil wetting (Ref. 72-00-00, P. Block 601). If the oil use is more than the limits (Ref. 71-00-00, P. Block 501), replace the engine (Ref. 71-00-00, P. Block 401).
	D Sump	Oil	Trace	(See NOTE 1 and NOTE 2)
	Pre SB GE 73-0293 Combustor Drain Valve	Fuel	None (See NOTE 3)	Examine the fuel nozzles for leaks by slowly pressurizing

	DRAINED COMPARTMENT	LIQUID	ALLOWABLE LEAKAGE	CORRECTIVE ACTION
				the fuel manifold to 10 psig (69 Kpa). Do a borescope inspection of the combustor at the same time to find the fuel nozzle(s) that has the leak. Replace the fuel nozzle(s) (Ref. 73-13-01, P. Block 401).
	End Pre SB GE 73-0293			
	Post SB GE 73-0293			
R R	Combustor Drain Valve			No leak check required. Combustor Drain Valve eliminated by SB GE 73-0293
	End Post SB GE 73-0293			

NOTE 1 : If the engine oil consumption is more than the limits (Ref. 71-00-00, P. Block 501), remove the engine (Ref. 71-00-00, P. Block 401).

NOTE 2 : Engine oil vapors from the oil vents can condense and collect at the bottom of the turbine rear frame and exhaust centerbody after an engine shutdown, during an engine windmill action, or during an engine motor operation. Maintenance is not necessary for those conditions. Do a check of the engine oil comsumption rate to make sure there is not a leak. If the engine oil consumption rate has shown a large increase or is above the maximum guidelines, do an inspection to find the cause of the leak.

NOTE 3 : If there was a fire in the engine after the shutdown, do the corrective action immediately.
If the engine does not start easily or has hot starts ; do the corrective action in less than 50 hours.
You can wait for up to 250 hours to do the corrective action if the leakage is not more than 1.5 gal/hr (5.67 liters/hr) and does not continue for more than 30 minutes.
Collect leakage flow for 30 minutes when you calculate the leakage rate. If the leakage rate is more than 1.5 gal/hr (5.67 liters/hr) or for more than 30 minutes, do the corrective action immediately.



SHROUD DRAINS

VBV - VARIABLE BYPASS VALVE ACTUATOR
VSV - VARIABLE STATOR VANE ACTUATOR
FUEL NOZZLE SUPPLY
T_2 SENSOR - AIR INLET TEMPERATURE
N_1 SENSOR - FAN SPEED

1 FUEL DRAIN MANIFOLD ELIMINATED BY SB GE 73-253

2 COMBUSTOR DRAIN VALVE ELIMINATED BY SB GE 73-0293

LEGEND:

A - AIR POPPET VALVE
B - FUEL DIRECT DRAIN
C - FUEL/OIL/WATER DIRECT DRAIN
D - FUEL COLLECT DRAIN
E - OIL COLLECT DRAIN
F - FUEL DIRECT DRAIN

SEAL DRAINS
- Y - N_1 SPEED SENSOR
- G - IDG DRAIN
- H - HYDRAULIC PUMP
- M - MAIN ENGINE CONTROL
- P - FUEL PUMP
- S - STARTER

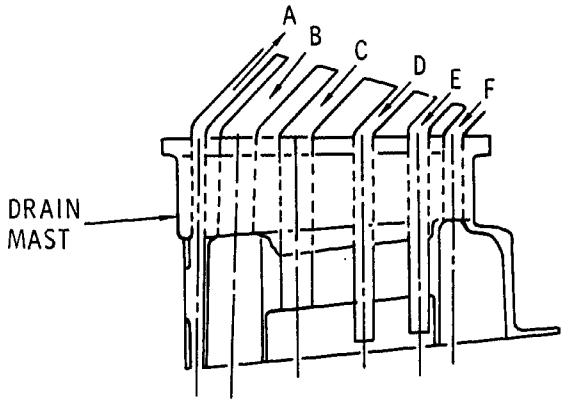
2 V - VALVE
X - IDG OIL COOLER (PRESSURE RELIEF)
Z - ACC SIGNAL VALVE
□ - KIT INTERFACE CONNECTIONS

1154627-00-A

BM5 71 70 00 6 LAM0 02

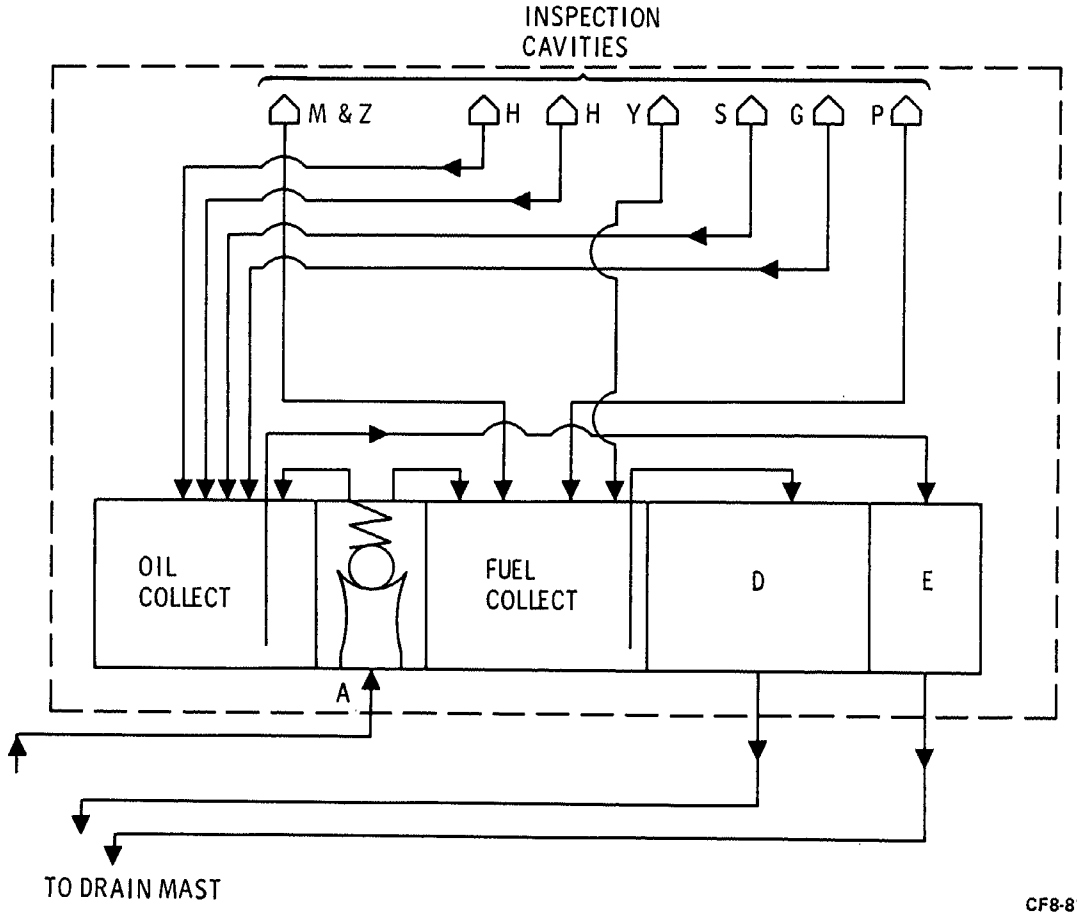
Schematic of Power Plant Drain
(PRE SB GE 72-700 and 72-701)
Figure 601

DETAIL A



LEGEND:
SEE SHEET 1

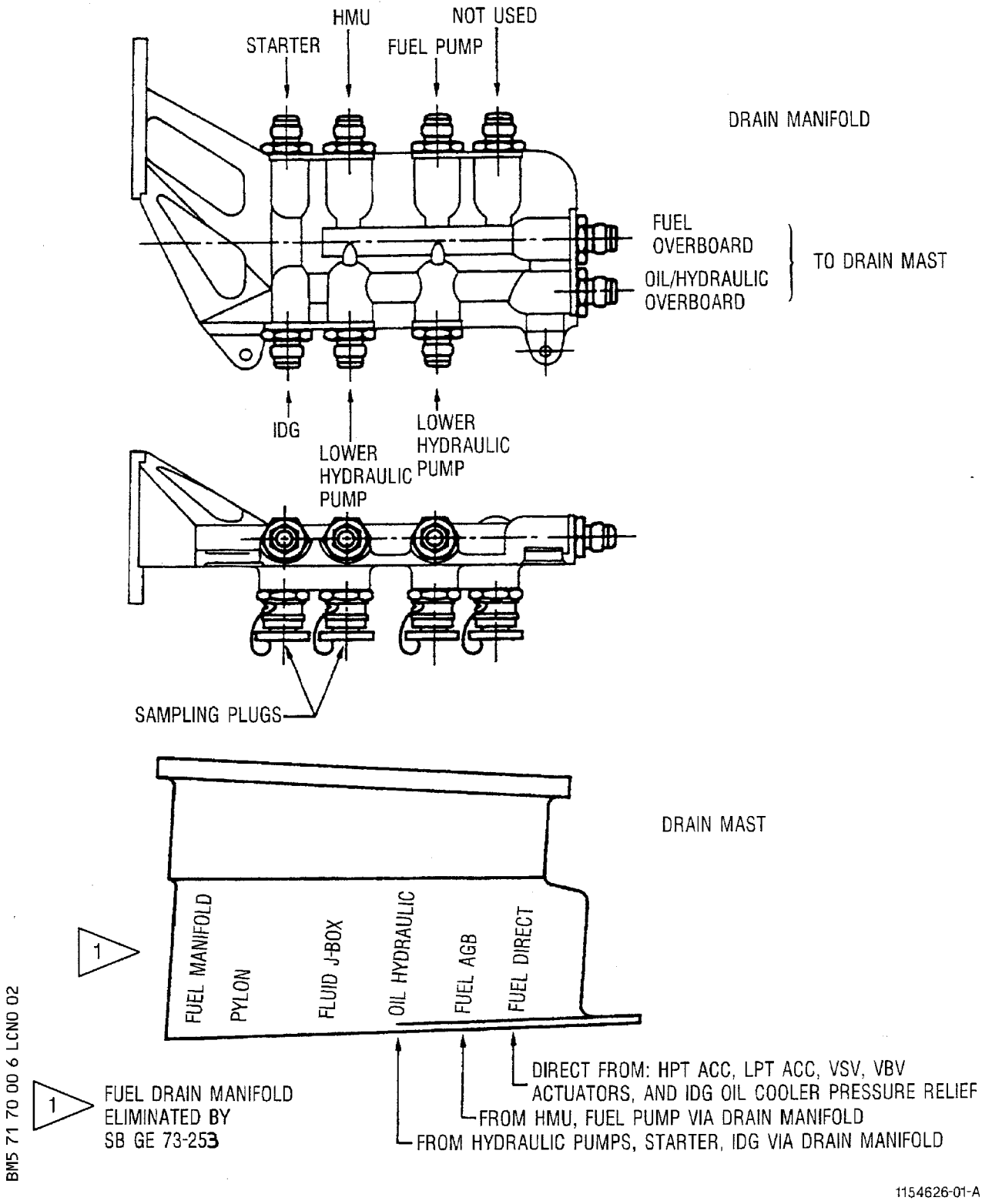
DETAIL B



BM5 71 70 00 6 LCM0 - 00

CF8-8194-0-A2A

Drain System Detail
(PRE SB GE 72-700 and 72-701)
Figure 602



Drain System Detail
(POST SB GE 72-700 and 72-701)
Figure 603

PRE SB GE 72-700 AND 72-701

1. Engine Drain Module - General

This procedure provides instructions for the disassembly and assembly of the engine drain module.

2. Cleaning of Engine Drain Module

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Regulated Air Pressure Supply
(2)Material No.C04-001	Cleaning Compounds and Solvents (Ref. 70-00-00)
Referenced Procedure - 71-70-21, P. Block 401	Engine Drain Module

B. Job Set-Up

(1)Remove Engine Drain Module (Ref. 71-70-21, P. Block 401).

C. Disassemble Engine Drain Module

(Ref. Fig. 201, 202)

CAUTION : WHEN REMOVING THE INTERFACE PLATE ASSEMBLY, MAKE SURE SIPHON TUBES ARE NOT DAMAGED.

(1)Remove the six bolts and nuts that attach the drain manifold to the interface plate assembly.

(2)Remove center mounting bolt and washer. Do not remove insert unless you are replacing the interface plate assembly.

(a)After separation of the drain manifold from the interface plate assembly, there is no requirement to clean the drain module if the witness chambers are not clogged with residual fluid.

(b)Reassemble the drain module per the assembly procedure outlined in Section 2.E. See paragraph 2.E(5), 2.E(7), and 2.E(8).

(c)Continue with step 2.E(3) if witness chambers are clogged with residual fluid.

(3)Remove drain manifold gasket.

(4)Remove valve stem and spring.

(5)Remove the two plugs (Ref. 71-70-21, P. Block 401).

(6)Remove seven bleed valves and preformed packings. Discard packings.

(7)Remove the two siphon tubes by removing bolts, brackets, and preformed packings. Discard packings.

D. Clean Engine Drain Module

WARNING : METHYL ETHYL KETONE (MEK) IS HIGHLY FLAMMABLE, VOLATILE, AND TOXIC. USE IN A WELL VENTILATED AREA. AVOID PROLONGED BREATHING OF VAPORS AND REPEATED OR PROLONGED CONTACT WITH THE SKIN.

(1)Use a stiff bristle brush and MEK to thoroughly clean all parts. Pay particular attention to threaded areas.

WARNING : USE PROTECTIVE EQUIPMENT TO GUARD EYES AND FACE WHEN USING COMPRESSED AIR. MAXIMUM ALLOWABLE AIR PRESSURE IS 30 PSIG (2.068 BARS). DO NOT DIRECT AIR STREAM TOWARD YOURSELF OR OTHER PERSONNEL.

(2)Rinse parts in clean MEK, and dry using a lint free cloth or dry shop air.

E. Assemble the Engine Drain Module (Ref. Fig. 201, 202, 203)

(1)Install the siphon tubes on the interface plate assembly with bolts, brackets, and new preformed packings. TORQUE to between 20 and 23 lbf.in. (0.23 and 0.26 m.daN) and wirelock.

(2)Install all the bleed valves, except for the MEC and MFP, with new preformed packings, in the drain manifold. TORQUE to between 75 and 125 lbf.in. (0.85 and 1.41 m.daN) and wirelock.

(3)Install the two plugs (Ref. 71-70-21, P. Block 401).

(4)Install the valve stem and spring.

CAUTION : MAKE SURE THE DRAIN MODULE GASKET IS INSTALLED CORRECTLY. INCORRECT INSTALLATION OF THE GASKET WILL NOT PERMIT THE FUEL TO DRAIN OVERBOARD IF A FUEL SYSTEM COMPONENT LEAK OCCURS.

(5)Install the drain manifold gasket.

NOTE : Make sure the gasket is installed correctly. The gasket must align correctly with center mount bolt hole.

(6)Install the insert if it was removed.

NOTE : The insert must be in the recess of 0.010 to 0.030 in. (0.25 to 0.76 mm) below the surface.

CAUTION : WHEN YOU INSTALL THE INTERFACE PLATE ASSEMBLY, MAKE SURE THE SIPHON TUBES ARE NOT DAMAGED.

(7)Compress the spring and install the center mount bolt and washer. TORQUE to between 20 and 23 lbf.in. (0.23 and 0.26 m.daN).

(8)Use a flashlight to see if the MEC and MFP drain holes are visible in the bleed valve ports. If they are not visible, the gasket is incorrectly installed.

(a)Remove the drain manifold and install the gasket correctly.

(b)Install the MEC and MFP bleed valves with new preformed packings, in the drain manifold.

(c)TORQUE the MEC and MFP bleed valves to between 75 and 125 lbf.in. (0.85 and 1.41 m.daN) and wirelock.

(d)Install the drain manifold again.

(e)Install the center mount bolt again. TORQUE to between 20 and 23 lbf.in. (0.23 and 0.26 m.daN).

(9)Install all the bolts and nuts that attach the interface plate assembly to the drain manifold. TORQUE to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

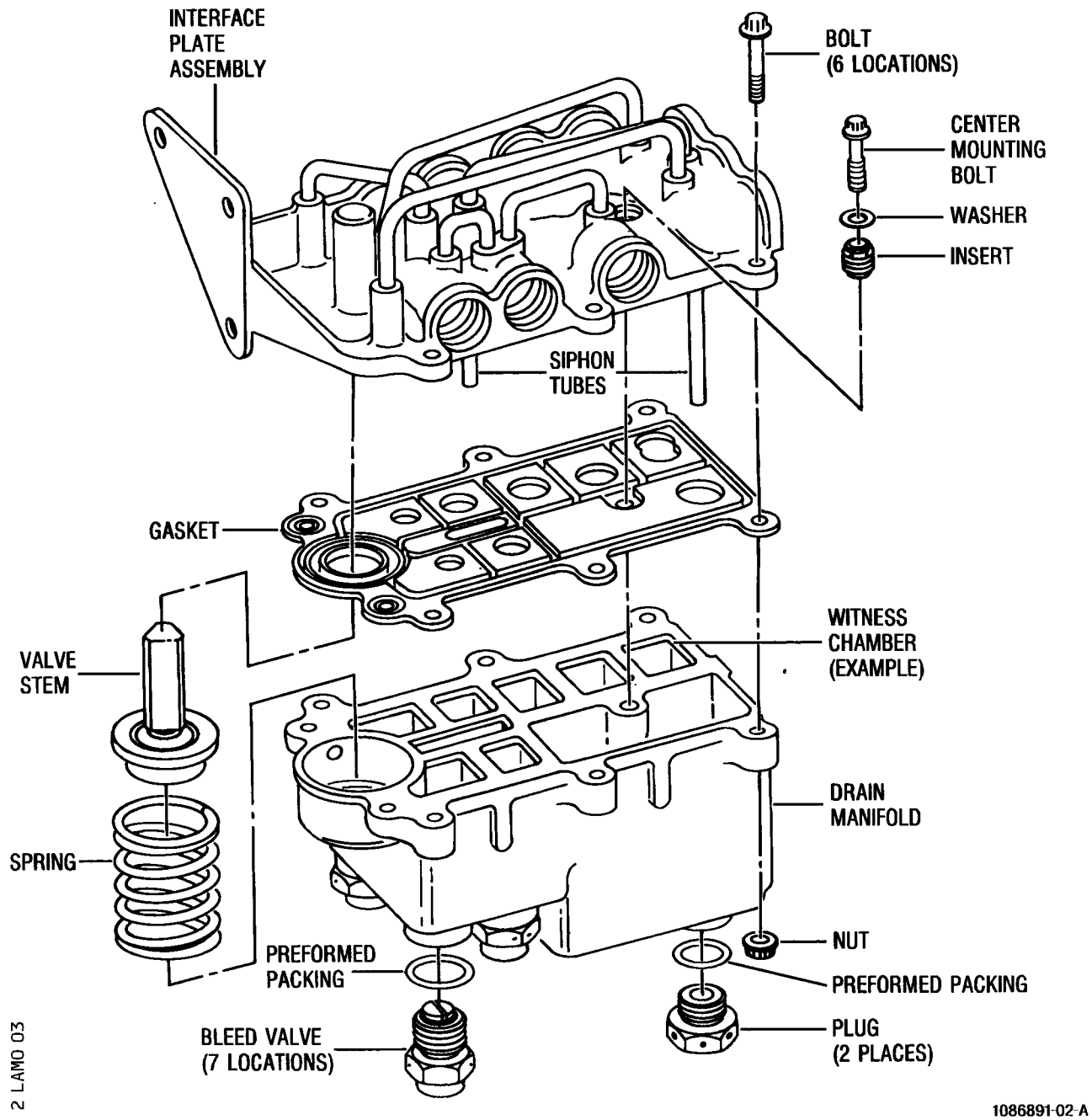
(10)Install the Engine Drain Module (Ref. 71-70-21, P. Block 401).

POST SB GE 72-700 AND 72-701

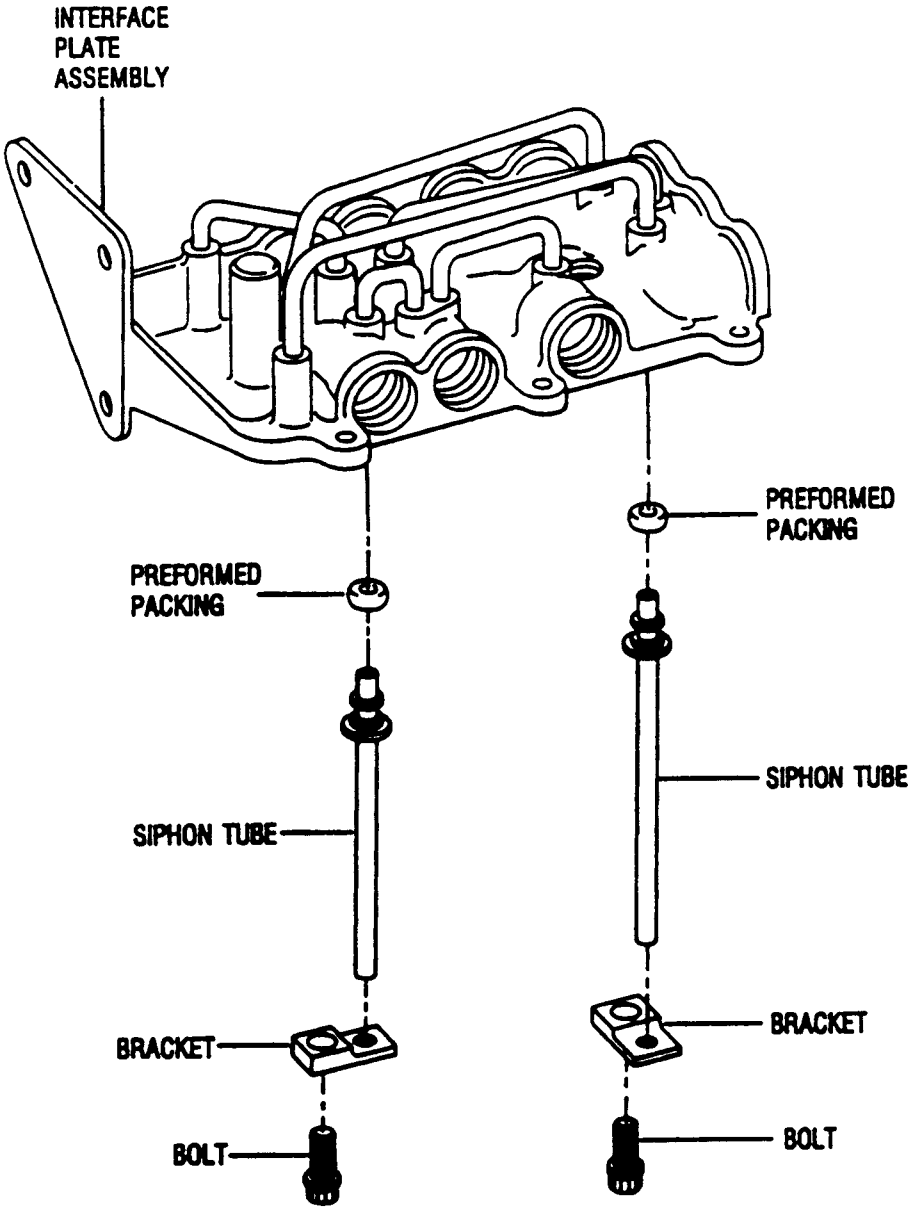
3. Engine Drain Manifold

Not applicable.

END POST SB GE 72-700 AND 72-701



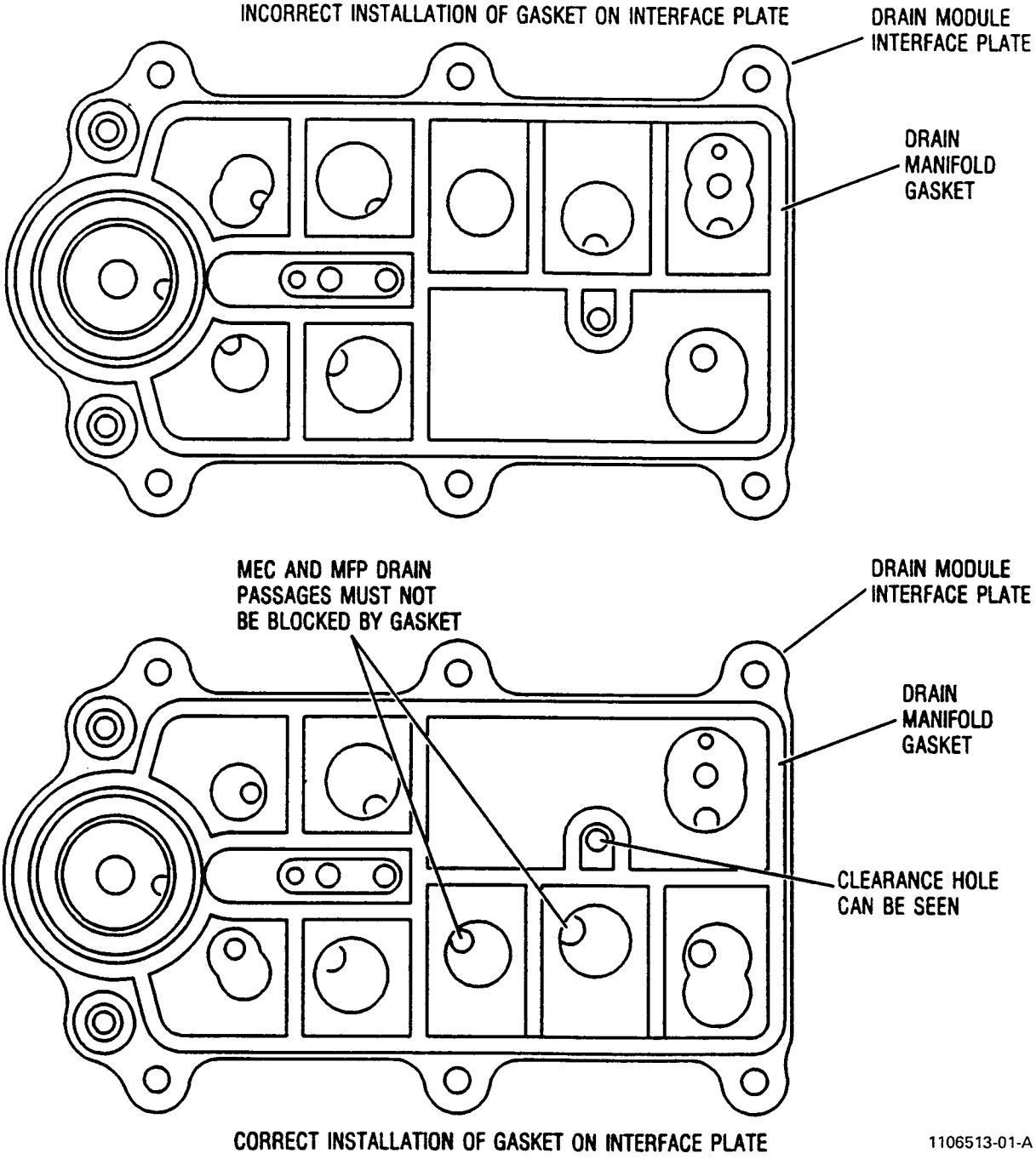
Engine Drain Module Assembly
(PRE SB GE 72-700 AND 72-701)
Figure 201



BM5 71 70 21 2 LBMO - 02

1086892-01-A

Engine Drain Module Assembly
(PRE SB GE 72-700 AND 72-701)
Figure 202


INCORRECT INSTALLATION OF GASKET ON INTERFACE PLATE
DRAIN MODULE INTERFACE PLATE
DRAIN MANIFOLD GASKET
MEC AND MFP DRAIN PASSAGES MUST NOT BE BLOCKED BY GASKET
DRAIN MODULE INTERFACE PLATE
DRAIN MANIFOLD GASKET
CLEARANCE HOLE CAN BE SEEN
CORRECT INSTALLATION OF GASKET ON INTERFACE PLATE
1106513-01-A

BM5 71 70 21 2 LCMO - 00

Interface Plate Gasket-Installation
(PRE SB GE 72-700 AND 72-701)
Figure 203

ENGINE DRAIN MODULE/MANIFOLD - REMOVAL/INSTALLATION

R 1. Engine Drain Module

A. General

(1)This procedure provides instructions for removal and installation of the engine drain module assembly.

(2)Access to the drain module is through fan thrust reverser cowl doors.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Circuit Breaker Safety Clips
(2)	Torque Wrench 50-430 lbf. in. (0.56-4.85 m.daN)
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

C. Procedure

(1)Job set-up

(a)Open, safety and tag the appropriate circuit breakers and open fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(2)Removal (Ref. Fig. 401)

(a)Place a suitable container under seven bleed valves and drain residual fluid by pressing valves.

(b)Remove two plugs and packings from drain module and drain. Reinstall plugs.

(c)Remove the bolts and nuts that attach the tube clamps to the brackets on the left side of the drain module.

(d)Disconnect the drain lines from the top of the drain module (10 places).

(e)Remove bolts from engine gearbox and remove drain module.

(f)If the drain module is replaced, do the steps that follow :

1 Remove the nut that attaches the bracket to the two left side housing bolts.

2 Remove the bracket from the housing bolts.

3 Install the nut on the housing bolts.

4 Remove the nipples and packings (10 places) from the drain module ports. Discard the packings.

(g)Install protective covers on drain tubes and drain module ports.

(3)Installation (Ref. Fig. 401)

(a)Remove the protective covers from drain tubes and drain module ports.

(b)If you replace the drain module with a new drain module, do the steps that follow :

1 Remove the nut from the two left side housing bolts.

2 Put the bracket in its position on the housing bolt.

3 Install the nut that attaches the bracket to the housing bolts.

4 TORQUE the nut to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

5 Install new packings on the nipples.

6 Install the nipples in the drain module and TORQUE to between 180 and

200 lbf.in. (2.03 and 2.26 m.daN).

(c) Install drain module on engine gearbox with bolts and washers. TORQUE bolts to between 50 and 70 lbf.in. (0.56 and 0.79 m.daN).

(d) Install the bolts and nuts that attach the tube clamps to the brackets.

(e) TORQUE the nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

(f) If the drain module removed in step 3.B. is being reinstalled, remove drain plugs and install a new packing on drain plugs.

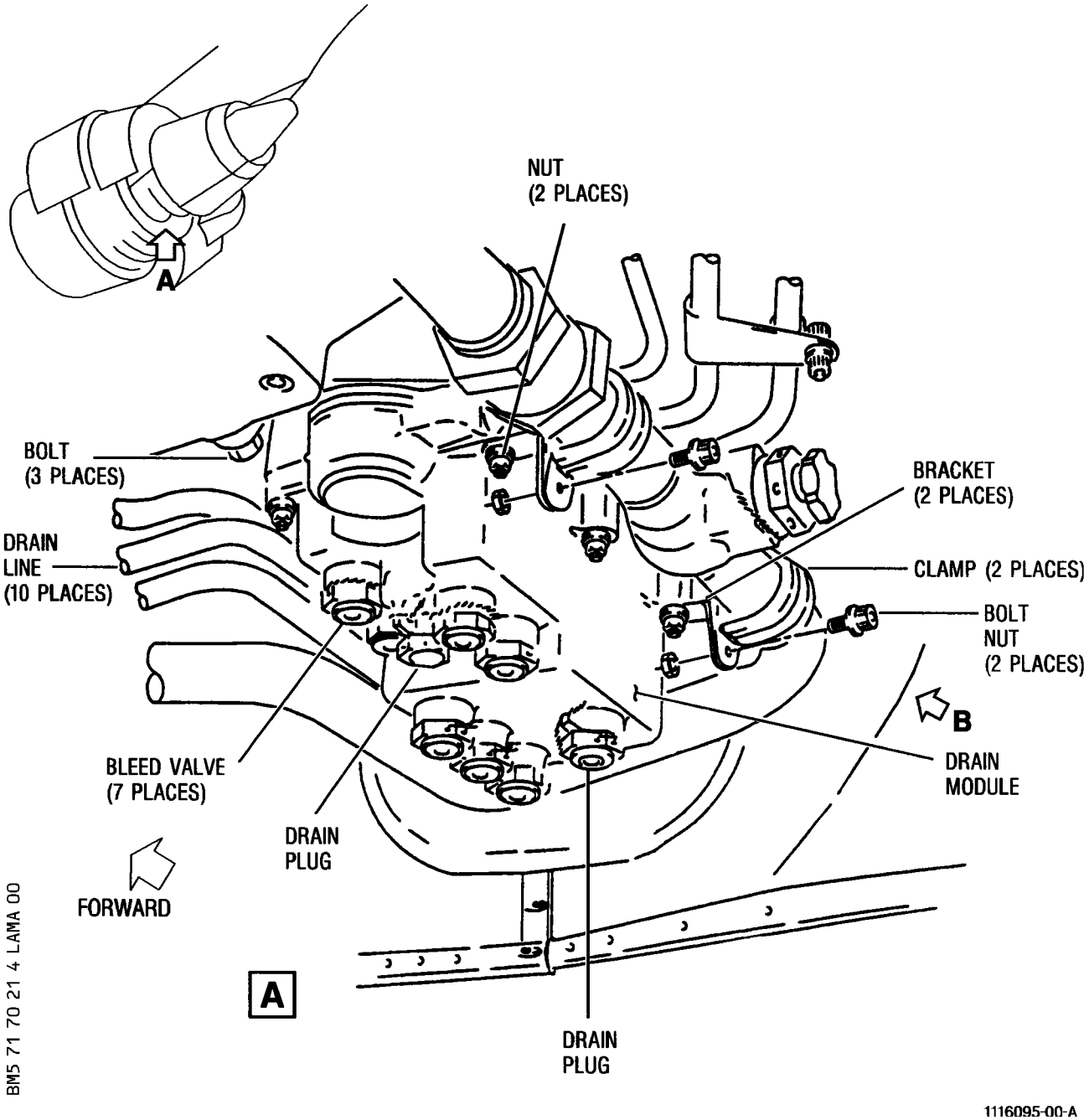
(g) Install drain plugs and TORQUE to between 135 and 150 lbf.in. (1.53 and 1.70 m.daN).

(h) Connect tube nuts for the drain lines to the top of the drain module. TORQUE to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).

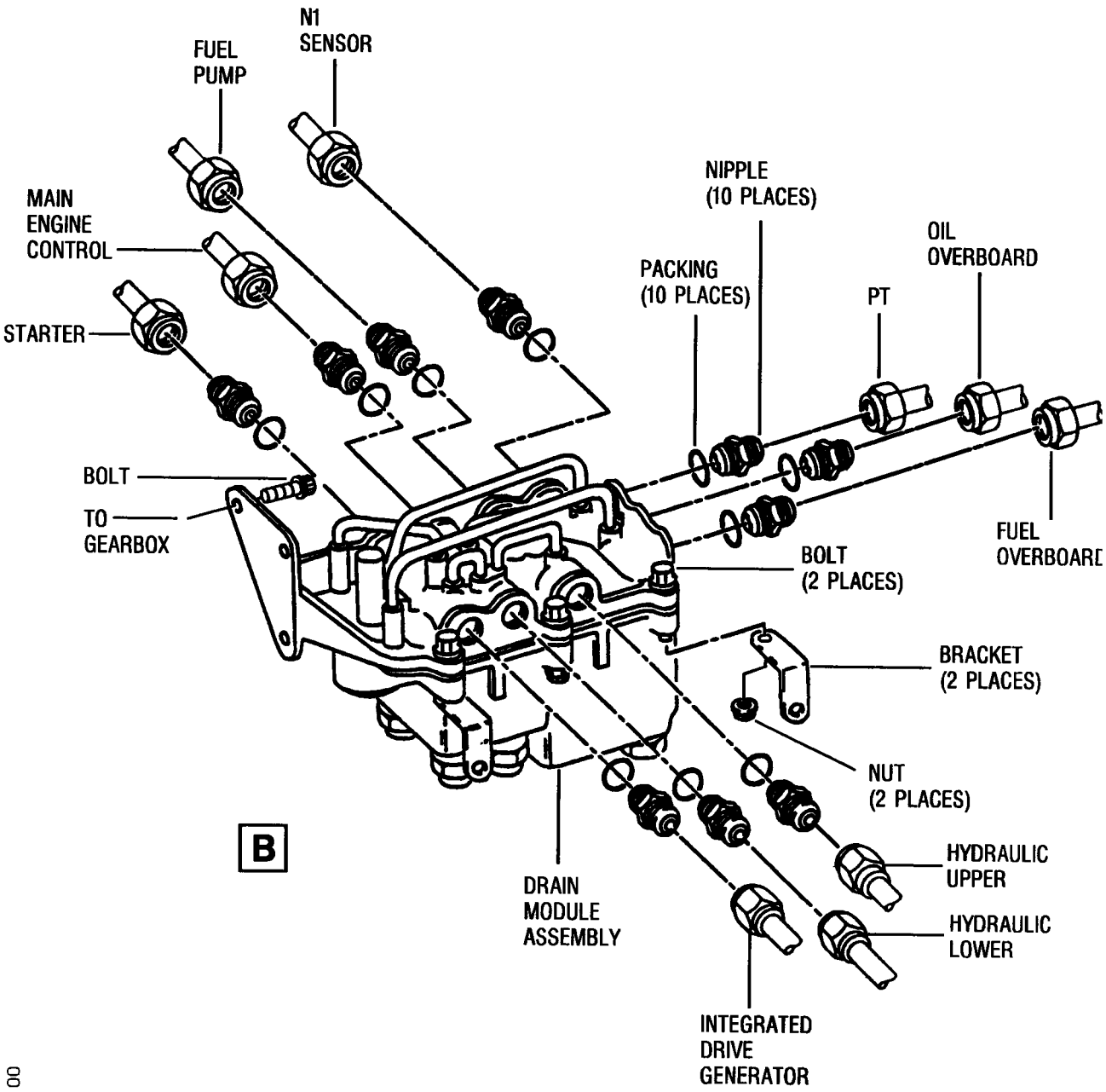
(4) Close-up

(a) Make certain that the working area is clean and clear of tools and miscellaneous items of equipment.

(b) Remove safety clips and tags and close circuit breakers. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).



Drain Module Assembly (Sheet 1/2)
Figure 401



BM5 71 70 21 4 LAMJ 00

Drain Module Assembly (Sheet 2/2)
Figure 401

R **ON A/C 001-100,

R Post SB 72-2029 For A/C 001-100,

ENGINE DRAIN MODULE/MANIFOLD - REMOVAL/INSTALLATION

1. Engine Drain Manifold

A. General

(1)This procedure provides instructions for removal and installation of the engine drain manifold.

(2)Access to the drain manifold is through the fan and thrust reverser cowl doors.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Circuit Breaker Safety Clips
(2)	Torque Wrench 50-430 lbf.in. (0.56-4.86 m.daN)
(3)	Caps and Plugs
(4)	Container, 5 gal (19 l) capacity
Referenced Procedures	
- 70-00-00, P. Block 201	Engine Standard Practices
- 71-13-00, P. Block 301	Cowl Doors

C. Procedure

(1)Job set-up

(a)Open, safety, and tag the appropriate circuit breakers and open the fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

(2)Removal (Ref. Fig. 402)

(a)Place a suitable container under the seven sampling drain plugs.

WARNING : DO NOT USE FUEL, OIL, OR HYDRAULIC FLUID NEAR FLAMES OR HEAT OR LET IT STAY ON YOUR SKIN. ALSO, MAKE SURE YOU HAVE A GOOD FLOW OF CLEAN AIR. THIS MATERIAL IS FLAMMABLE AND DANGEROUS TO YOUR SKIN, EYES, AND LUNGS.

(b)Push and turn the sampling drain plugs 1/4 turn and drain the residual fluid into the container.

(c)Remove the bolts and nuts that attach the tube clamps to the brackets on the left side of the drain manifold.

(d)Remove the bolts and nuts that attach the brackets to the drain manifold.

NOTE : Keep the brackets.

(e)Disconnect the drain tubes (9 places) from the drain manifold.

(f)Remove the bolts (3 places) that attach the drain manifold to the engine gearbox.

(g)Remove the drain manifold.

(h)Install protective caps and plugs on drain tubes and drain manifold

ports.

(3)Installation (Ref. Fig. 402)

(a)Remove the protective caps and plugs from the drain tubes and drain manifold ports.

(b)Put the brackets on the drain manifold and secure with the bolts and nuts. TORQUE the nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

NOTE : The brackets are positioned below the drain manifold.

(c)Install the drain manifold on the engine gearbox with bolts. TORQUE the bolts to between 55 and 70 lbf.in. (0.62 and 0.79 m.daN) and safety with cable (Ref. 70-00-00, P. Block 201).

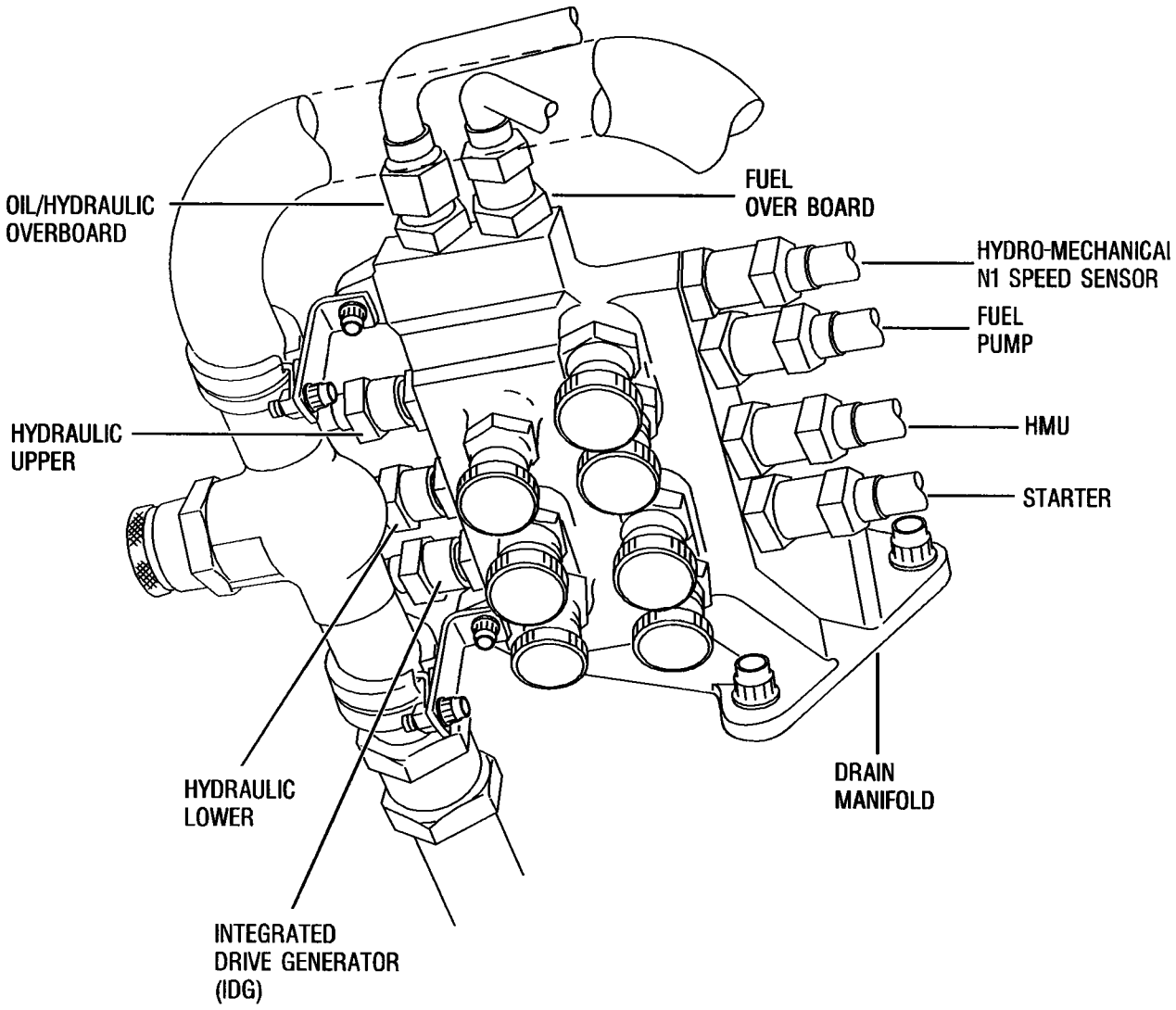
(d)Install the bolts and nuts that attach the tube clamps to the brackets. TORQUE the nuts to between 33 and 37 lbf.in. (0.37 and 0.42 m.daN).

(e)Connect the drain tube nuts to the drain manifold. TORQUE the tube nuts to between 270 and 300 lbf.in. (3.05 and 3.39 m.daN).

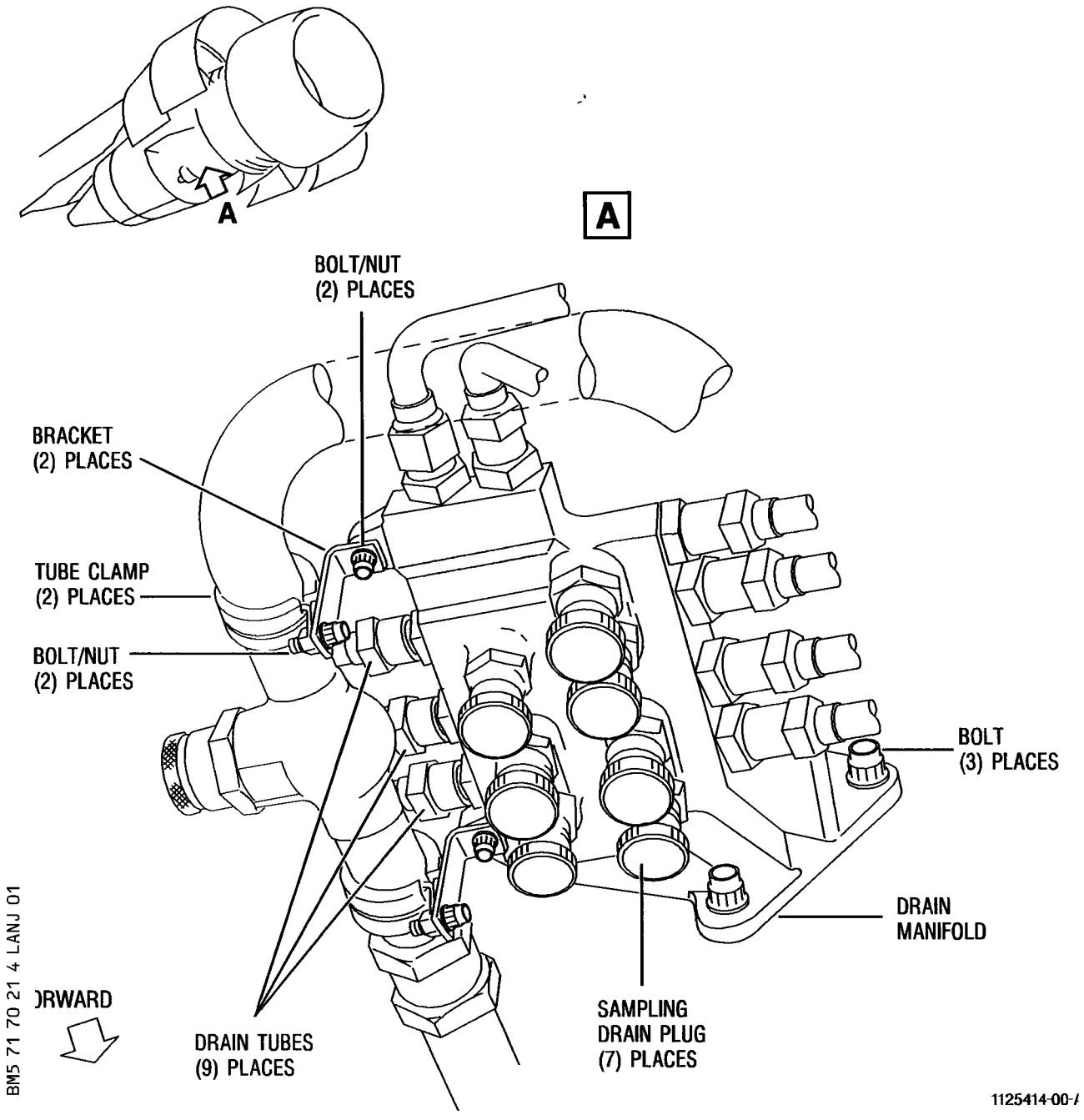
(4)Close-up

(a)Make certain that the working area is clean and clear of tools and miscellaneous items of equipment.

(b)Remove safety clips and tags and close circuit breakers. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).



Drain Manifold (Sheet 1/2)
Figure 402



Drain Manifold (Sheet 2/2)
Figure 402

ENGINE ACCESSORY DRAIN OUTLET MAST - REMOVAL/INSTALLATION

1. General

This procedure provides instructions for removal and installation of the lower drain mast.

Access to the lower drain mast is through the fan thrust reverser cowl doors.

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Torque Wrench 50-70 lbf.in. (0.56-0.79 m.daN)
C.	Gasket
Referenced Procedure - 71-13-00, P. Block 301	Cowl Doors

3. Procedure

A. Job Set-Up

(1) Open, safety and tag the appropriate circuit breakers and open the fan and thrust reverser cowl doors (Ref. 71-13-00, P. Block 301).

B. Removal (Ref. Fig. 401)

(1) Remove bolts and washers from lower drain mast.

(2) Remove mast and gasket. Discard gasket.

C. Installation (Ref. Fig. 401)

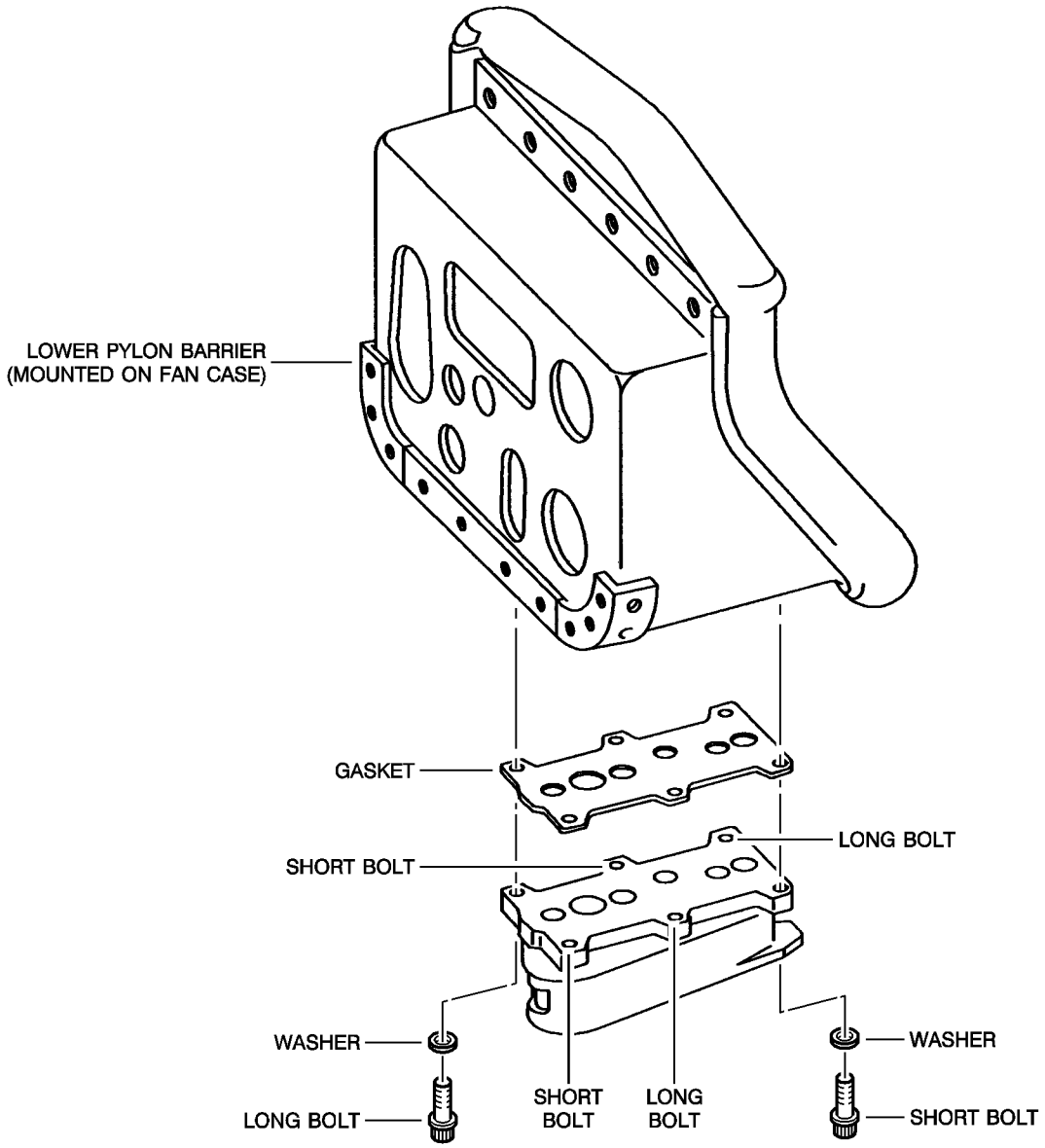
(1) Position a new lubricated gasket on drain mast, making certain all drain tube openings in gasket align with holes in drain mast.

(2) Attach gasket and drain mast to fire barrier interface with bolts and washers. Make certain that the long and short bolts are installed correctly (Ref. Fig. 401). TORQUE bolts to between 50 and 70 lbf. in. (0.56 and 0.79 m. daN).

D. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Remove safety clips and tags and close circuit breakers. Close thrust reverser and fan cowl doors (Ref. 71-13-00, P. Block 301).



BM5 71 70 31 4 LAM0 01

Lower Drain Mast
Figure 401